

Service  
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# Service Manual



## TABLE OF CONTENTS

	Page
Location of pc boards & Version variations .....	1-2
Technical Specifications .....	1-3
Measurement setup .....	1-4
Service Aids, Safety Instruction, etc. ....	1-5
Instruction for use: Overseas version exerpt.....	2-1
Additional features .....	2-10
Disassembly Instructions & Service positions .....	3-1
Service Test Programs .....	3-3
Set Block diagram .....	4
Set Wiring diagram .....	5
Front Board .....	6
Tuner Board: ECO5 Sys .....	7B
Tuner 95 .....	7D
ETF6-FE Module .....	9
3CDC 99 Module .....	10
Combi Board .....	11
Set Mechanical Exploded view & parts list .....	12

**CLASS 1  
LASER PRODUCT**

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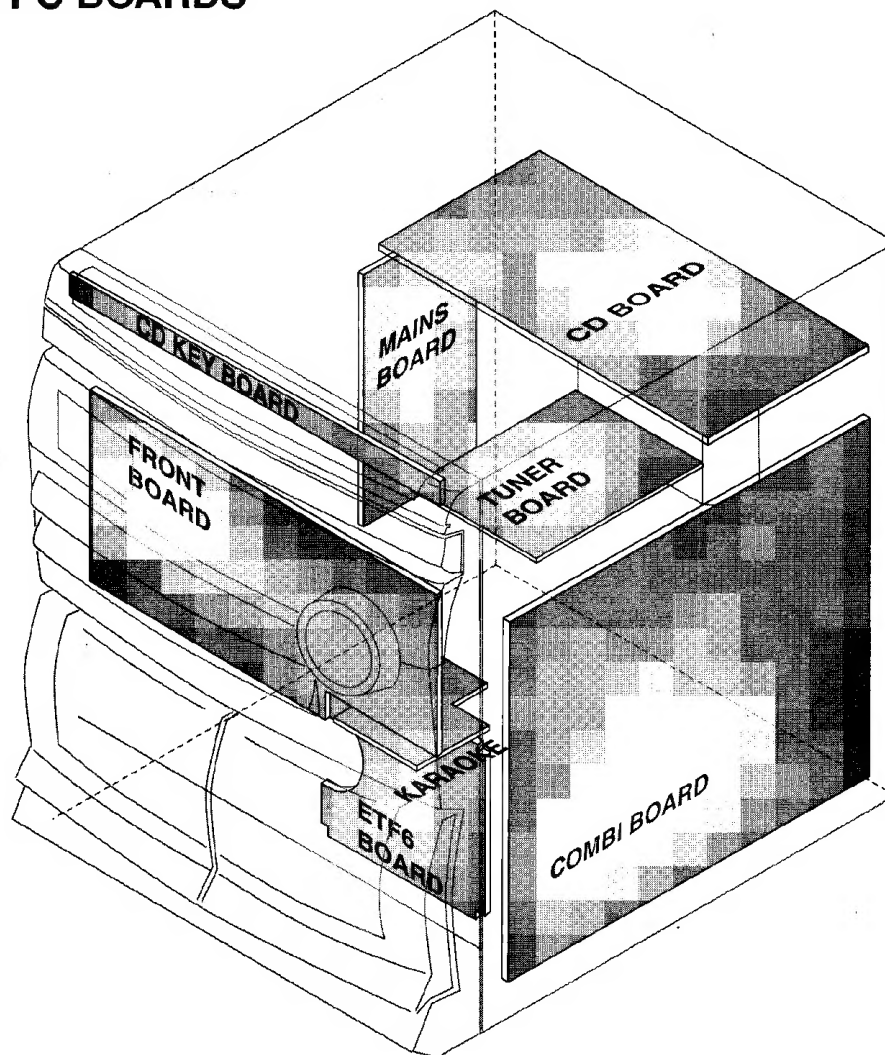
4822 725 26291

PCS 101 127



# PHILIPS

## LOCATION OF PC BOARDS



### VERSION VARIATIONS:

Type /Versions:	FW390C					FW398C			
	/21	/21M	/22	/34	/37	/21	/21M	/30	/34
Features & Board in used:									
Dolby B									
Incredible Surround	x	x	x	x	x	x	x	x	x
Karaoke	x	x				x	x		
News			x	x					x
RDS			x	x					x
CD Text									
Rotary Encoder (volume control)	x	x	x	x	x	x	x	x	x
Voltage Selector	x	x				x	x		
Aux Input	x	x	x	x	x	x	x	x	x
Digital Output									
Headphone Socket	x	x	x	x	x	x	x	x	x
Line Output									
Subwoofer Output	x	x	x	x	x	x	x	x	x
Surround Output									
Matrix Surround Loudspeakers						x	x	x	x
Tuner board - ECO5 Sys	x	x		x	x	x	x	x	x
Tuner board - Tuner 95			x						
Combi board - Supply 12W									
Combi board - Supply 18W	x	x	x	x	x	x	x	x	x

## SPECIFICATIONS

### GENERAL:

Mains voltage : 110-127V/220-240V Switchable for /21/21M  
 120V for /37  
 220V for /33  
 220-230V for /22/34  
 230V for /25  
 230-240V for /30  
 Mains frequency : 50/60Hz  
 Power consumption : < 15W at Standby  
 44W at 1/8 rated power out  
 Clock accuracy : < 4 seconds per day  
 Dimension centre unit : 265 x 310 x 330mm

### TUNER:

#### FM

Tuning range : 87.5-108MHz  
 65.81-74MHz for /34  
 Grid : 50kHz (& 30kHz for /34)  
 100kHz for /37  
 IF frequency : 10.7MHz  $\pm$  25kHz  
 Aerial input : 75ohm coaxial  
 300ohm click fit for /37  
 Sensitivity at 26dB S/N : < 7 $\mu$ V  
 Selectivity at 600kHz bandwidth : > 50dB  
 Image rejection : > 25dB [> 75dB]  
 Distortion at RF=1mV, dev. 75kHz : < 3% [< 2%]  
 -3dB Limiting point : < 8 $\mu$ V  
 Crosstalk at RF=1mV, dev. 40kHz : > 18dB [> 26dB]

#### MW

Tuning range : 531-1602kHz  
 530-1700kHz for /21/37  
 Grid : 9kHz  
 10kHz for /21/37  
 IF frequency : 450kHz  $\pm$  1kHz  
 Aerial input : Frame aerial  
 Sensitivity at 26dB S/N : < 4.0mV/M  
 Selectivity at 18kHz bandwidth : > 18dB  
 IF rejection : > 45dB  
 Image rejection : > 28dB  
 Distortion at RF=50mV, m=80% : < 5%

#### LW

Tuning range : 153-279kHz  
 Grid : 3kHz  
 IF frequency : 450kHz  $\pm$  1kHz  
 Aerial input : Frame aerial  
 Sensitivity at 26dB S/N : [< 6.0mV/M]  
 Selectivity at 18kHz bandwidth : [> 22dB]  
 IF rejection : [> 40dB]  
 Image rejection : [> 35dB]  
 Distortion at RF=50mV, m=80% : [< 5%]

### AMPLIFIER:

Output power <sup>1)</sup> Left/Right : 2 x 25W @ 6 ohm  $\pm$  1dB  
 Surround <sup>2)</sup> : 2 x 5W @ 6 ohm  $\pm$  1dB  
 Frequency response within  $\pm$ 3dB : 50Hz-15kHz  
 Dynamic Bass Boost : DBB ON, DBB Off <sup>3)</sup>  
 Incredible Surround : IS, IS Off <sup>3)</sup>  
 Digital Sound Control : Jazz, Techno, Optimal, Rock <sup>3)</sup>  
 Input sensitivity  
 Aux-in : 700mV  $\pm$  3dB at 600ohm  
 Mic : 3.0mV  $\pm$  3dB at 600ohm  
 Output sensitivity  
 Sub-woofer : 1.5V  $\pm$  3dB at 22kohm  
 Headphone : 15mW at 32ohm

### CASSETTE RECORDER:

Number of track : 2 x 2 stereo  
 Tape speed : 4.76 cm/sec  $\pm$  2%  
 1.6 x 4.76 cm/sec  
 Wow and flutter : < 0.4% DIN  
 Fast-wind/rewind time C60 : 130 sec  
 Bias system : 75kHz  $\pm$  10kHz  
 Rec/Pb frequency response within 8dB : 80Hz - 12.5kHz  
 Signal to noise ratio (type I) : > 48dBA

### COMPACT DISC:

Measurement done at output conn. of the CDC module.  
 Frequency response within  $\pm$  1.5dB: 20Hz - 20kHz  
 Output level (in Vrms) : 550mV  $\pm$  2dB unloaded  
 Signal/Noise ratio (A-weighted) : > 80dBA  
 Total Harmonic Distortion : < 0.003%  
 Channel Unbalance : < 1dB  
 Channel separation at 1kHz : > 60dB  
 De-emphasis : 0 or 15/50  $\mu$ S (Switched by subcode on the disc)

[...] Values indicated are for "Tuner 95 Board" only

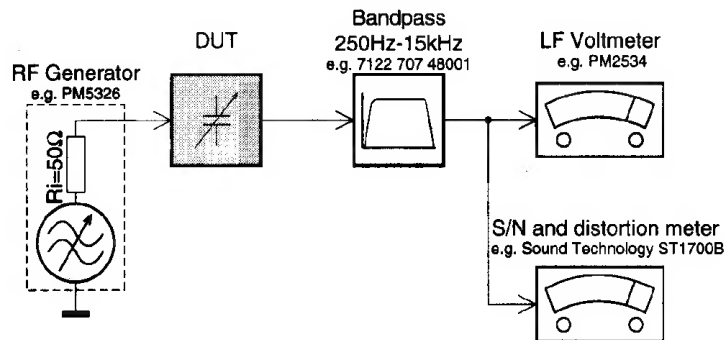
<sup>1)</sup> 1kHz, 10% THD

<sup>2)</sup> Only for FW398C

<sup>3)</sup> Frequency response in each setting is software controlled.

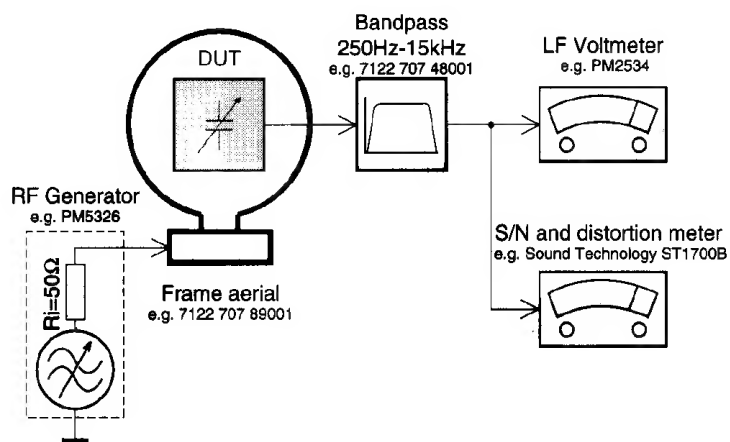
## MEASUREMENT SETUP

### Tuner FM



Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilotone (19kHz, 38kHz).

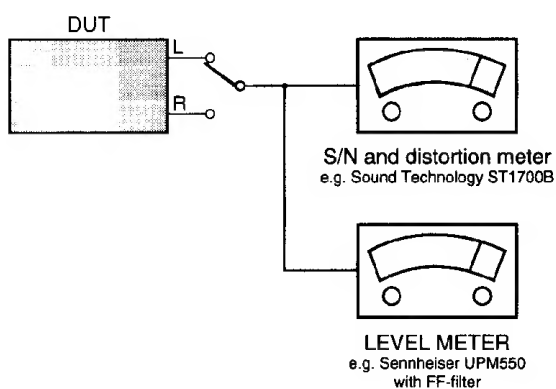
### Tuner AM (MW, LW)



To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday's cage.  
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

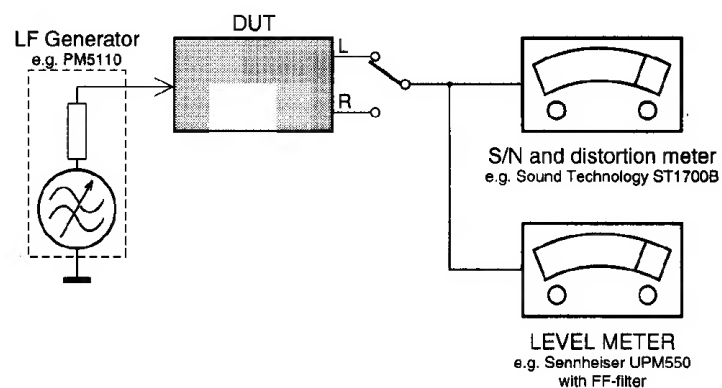
### CD

Use Audio Signal Disc SBC429 4822 397 30184  
(replaces test disc 3)



### Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069  
or Universal Test Cassette **Fe** SBC420 4822 397 30071



## SERVICE AIDS

### Service Tools:

Universal Torx driver holder .....	4822 395 91019
Torx bit T10 150mm .....	4822 395 50456
Torx driver set T6 - T20 .....	4822 395 50145
Torx driver T10 extended .....	4822 395 50423

### Cassette:

SBC419 Test cassette CrO <sub>2</sub> .....	4822 397 30069
SBC420 Test cassette Fe .....	4822 397 30071
MTT150 Dolby level 200nWb/M .....	4822 397 30271

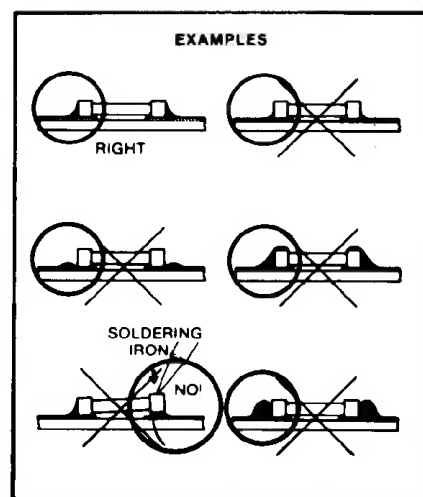
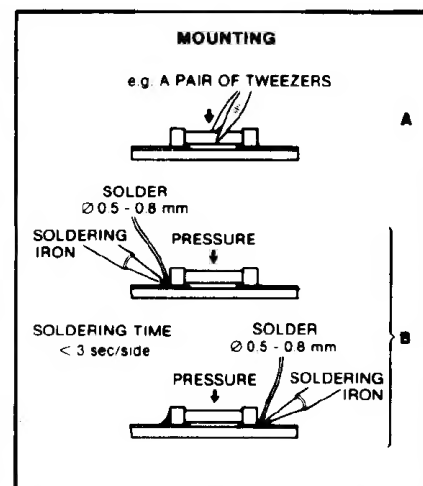
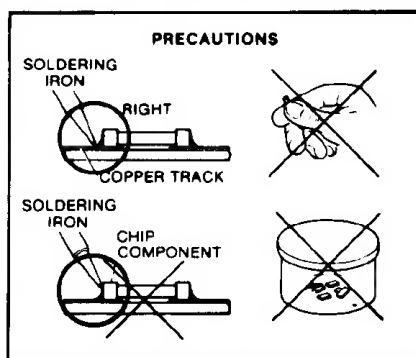
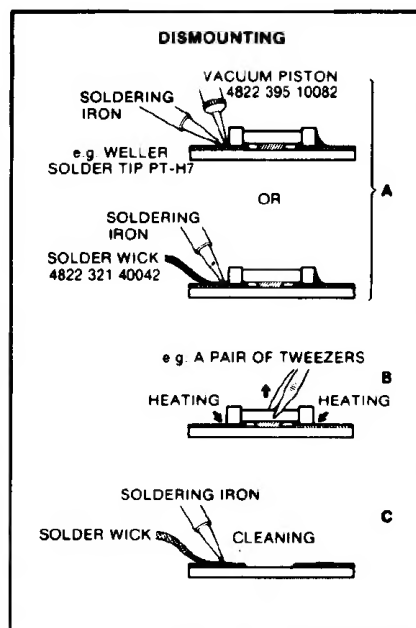
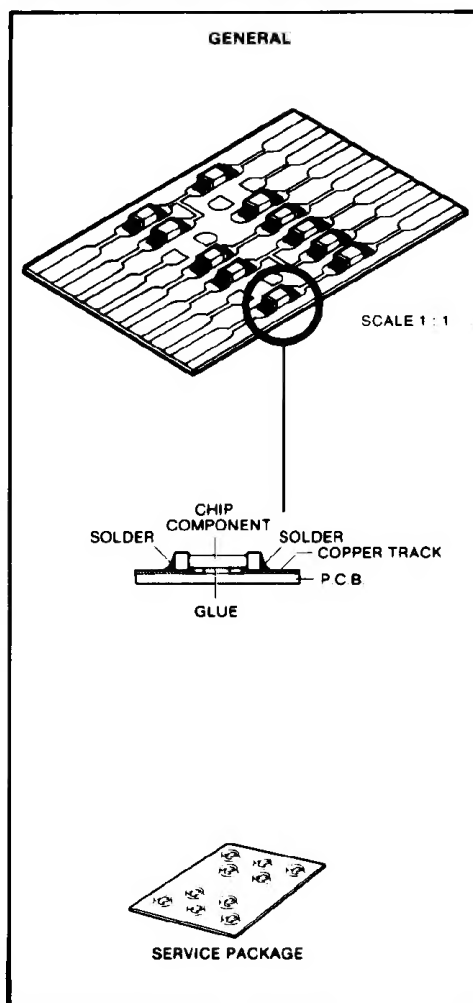
### Compact Disc:

SBC426/426A Test disc 5 + 5A .....	4822 397 30096
SBC442 Audio Burn-in Test disc 1kHz .....	4822 397 30155
SBC429 Audio Signals disc .....	4822 397 30184
Dolby Pro-logic Test Disc .....	4822 395 10216

### ESD Equipment:

Anti-static table mat - large 1200x650x1.25mm ...	4822 466 10953
Anti-static table mat - small 600x650x1.25mm .....	4822 466 10958
Anti-static wristband .....	4822 395 10223
Connector box (1M $\Omega$ ) .....	4822 320 11307
Extension cable	
(to connect wristband to conn. box) .....	4822 320 11305
Connecting cable	
(to connect table mat to conn. box) .....	4822 320 11306
Earth cable (to connect product to mat or box) ....	4822 320 11308
Complete kit ESD3	
(combining all above products) .....	4822 320 10671
Wristband tester .....	4822 344 13999

## HANDLING CHIP COMPONENTS



27 012C12

**(GB) WARNING**

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.

When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

**ESD****(NL) WAARSCHUWING**

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).

Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.

Houd componenten en hulpmiddelen ook op hetzelfde potentiaal.

**(F) ATTENTION**

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD).

Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation.

Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfilier le bracelet muni d'une résistance de sécurité.

Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

**(D) WARNUNG**

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).

Unvorsichtige Behandlung im Reparaturfall kann die Lebensdauer drastisch reduzieren.

Veranlassen Sie, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand verbunden sind mit dem gleichen Potential wie die Masse des Gerätes.

Bauteile und Hilfsmittel auch auf dieses gleiche Potential halten.

**(I) AVVERTIMENTO**

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).

La loro longevità potrebbe essere fortemente ridotta in caso di non osservazione della più grande cauzione alla loro manipolazione.

Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.

Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

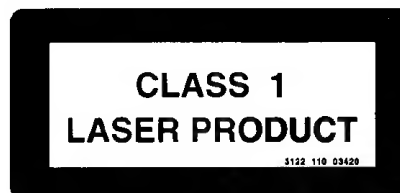
**(GB)**

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used.

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

**(NL)**

Veiligheidsbepalingen vereisen, dat het apparaat bij reparatie in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.

**(F)**

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utilisés les pièces de rechange identiques à celles spécifiées.

**(GB) Warning !**

Invisible laser radiation when open.  
Avoid direct exposure to beam.

**(D)**

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Geräts darf nicht verändert werden; für Reparaturen sind Original-Ersatzteile zu verwenden.

**(S) Varning !**

Osynlig laserstrålning när apparaten är öppnad och spärrar är urkopplad. Betrakta ej strålen.

**(I)**

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati.

**(SF) Varoitus !**

Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen!

**(DK) Advarse !**

Usynlig laserstrålning ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

"After servicing and before returning set to customer perform a leakage current measurement test from all exposed metal parts to earth ground to assure no shock hazard exist. The leakage current must not exceed 0.5mA."

## CONTENTS

## GENERAL INFORMATION

## SAFETY INFORMATION

General Information .....	5
Safety Information .....	5
Preparation .....	6 - 7
Controls .....	8 - 9
Operating The System .....	10 - 11
CD .....	12 - 14
Tuner .....	14 - 15
Tape .....	16 - 17
Aux .....	17
Karaoke .....	17
Recording .....	18 - 19
Clock .....	19
Timer .....	20
Maintenance .....	21
Specifications .....	21
Troubleshooting .....	22

**IMPORTANT:**  
PLEASE NOTE THAT THE  
VOLTAGE SELECTOR  
LOCATED AT THE REAR OF  
THIS SYSTEM IS PRESET AT  
220V FROM THE FACTORY.  
FOR COUNTRIES THAT  
OPERATE AT 110V, PLEASE  
ADJUST TO 110V BEFORE YOU  
SWITCH ON THE SYSTEM.

## General Information

- The typeplate (which contains the serial number) is located at the rear of the system.
- Recording is permissible if copyright or other rights of third parties are not infringed.

## Environmental Information

All unnecessary packaging has been omitted. We have tried to make the packaging easy to separate into three materials: cardboard (box), polystyrene foam (buffer) and polyethylene (bags, protective foam sheet).

Your system consists of materials which can be recycled and reused if disassembled by a specialized company. Please observe the local regulations regarding the disposal of packaging materials, exhausted batteries and old equipment.

## Accessories (Supplied)

- Remote control
- Batteries (two x AA size) for remote control
- AM loop antenna
- FM wire antenna
- AC power cord
- One pair of Surround Speakers (FW398C only)

## Safety Information

- Before operating the system, check that the operating voltage indicated on the typeplate (or the voltage indication beside the voltage selector) of your system is identical with the voltage of your local power supply. If not, please consult your dealer. The type plate is located at the rear of your system.
- When the system is switched on, do not move it around.
- Place the system on a solid base (e.g. a cabinet).
- Place the system in a location with adequate ventilation to prevent internal heat build-up in your system.
- Do not expose the system to excessive moisture, rain, sand or heat sources.
- Under no circumstances should you repair the system yourself, as this will invalidate the warranty!

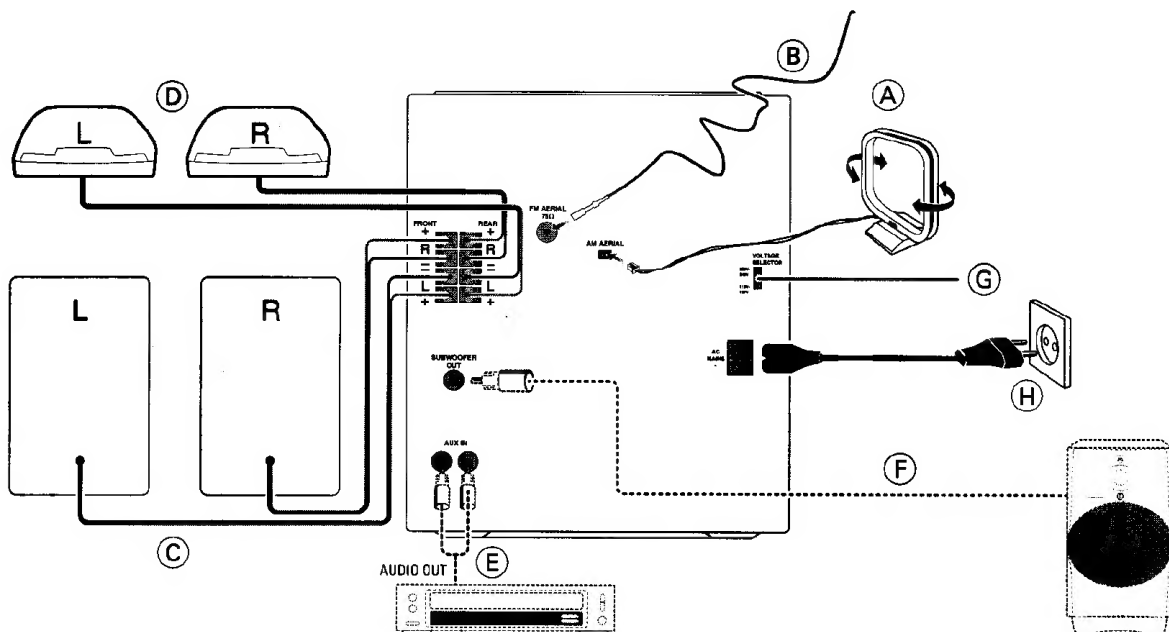
- If the system is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lens of the CD unit inside the system. Should this occur, the CD player will not operate normally. Leave the power on for about one hour with no disc in the system until normal playback is possible.
- Electrostatic discharge may cause unexpected problems. See whether these problems disappear if you unplug the AC power cord and plug it in again after a few seconds.
- **To disconnect the system from the power supply completely, remove the AC power plug from the wall socket.**

English

5

## PREPARATION

## Rear Connections



**A AM Antenna Connection**

Connect the supplied loop antenna to the AM AERIAL terminal. Place the AM loop antenna far away from the system and adjust its position for the best reception.

**B FM Wire Antenna Connection**

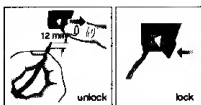
Connect the supplied FM wire antenna to the FM 75  $\Omega$  terminal. Adjust the position of the FM antenna for the best reception.

**Outdoor Antenna**

For better FM stereo reception connect an outdoor FM antenna to the FM AERIAL 75  $\Omega$  terminal using a 75  $\Omega$  coaxial wire.

**C Speaker Connections**

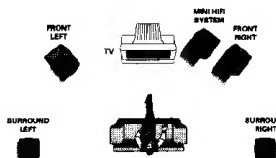
- Connect the right speaker to Front terminal R, with the red wire to + and the black wire to -.
- Connect the left speaker to Front terminal L, with the red wire to + and the black wire to -.
- Clip the stripped portion of the speaker wire as shown.

**D Surround Speakers Connection (for FW398C only)****4-Speakers Connection**

- **Front speakers** : Connect the black wires to the black FRONT terminals and the red wires to the red FRONT terminals.
- **Rear (surround) speakers** : Connect the black or non-marked wires to the black REAR terminals and the white or marked wires to the grey REAR terminals.

**Positioning the Speakers**

To get the best surround sound effect, place the speakers as follow.

**Front Left and Right Speakers**

For best listening effect, it is recommended to have the Left and Right speakers to form an angle of approximately 45 degrees to the listener. Should the magnetic field from the speakers affect the picture of the television, you should increase the separation distance.

**Rear (surround) Speakers**

The surround speaker should be placed at normal listening ear level. It can also be mounted on the wall at the back of the room. Most important, sometimes you need to experiment creatively when placing the surround speakers in order to obtain the most ideal sound projection.

**E Connecting other equipment to your system**

You can connect the audio left and right OUT terminals of a TV, VCR, Laser Disc or DVD player to the AUX IN terminals at the rear of the system.

**F Subwoofer Out Connection**

You can connect either an optional active subwoofer or an optional wireless active subwoofer to the SUBWOOFER OUT terminal. The wireless system uses a radio frequency transmitter. The subwoofer reproduces just the low bass effect (e.g. explosions, the rumble of the spaceships, etc.). Be sure to follow the instructions supplied with the subwoofer unit.

**Note:**

- Availability of wireless transmitter and its peripherals are subjected to the approval of local authorities. Please check with respective local safety or approving authority.

**G Adjusting the Operating Voltage (for version /21/21M only)**

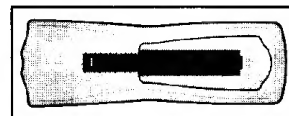
Before connecting the AC power cord to the wall outlet, make sure that the voltage selector at the rear of the system is set to the local power line voltage. If not, reset the selector before connecting to the wall outlet.

**H AC Power Supply**

After all other connections have been made, connect the AC power cord to the system and to the wall outlet.

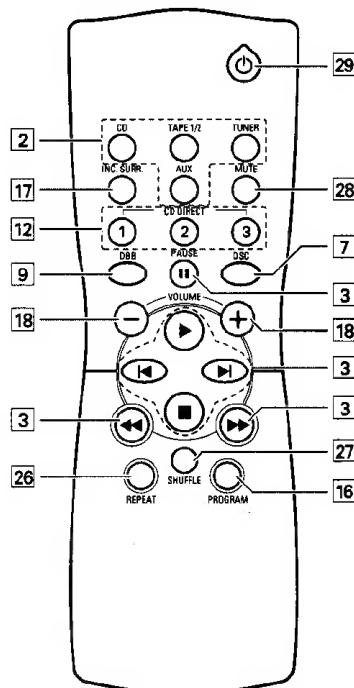
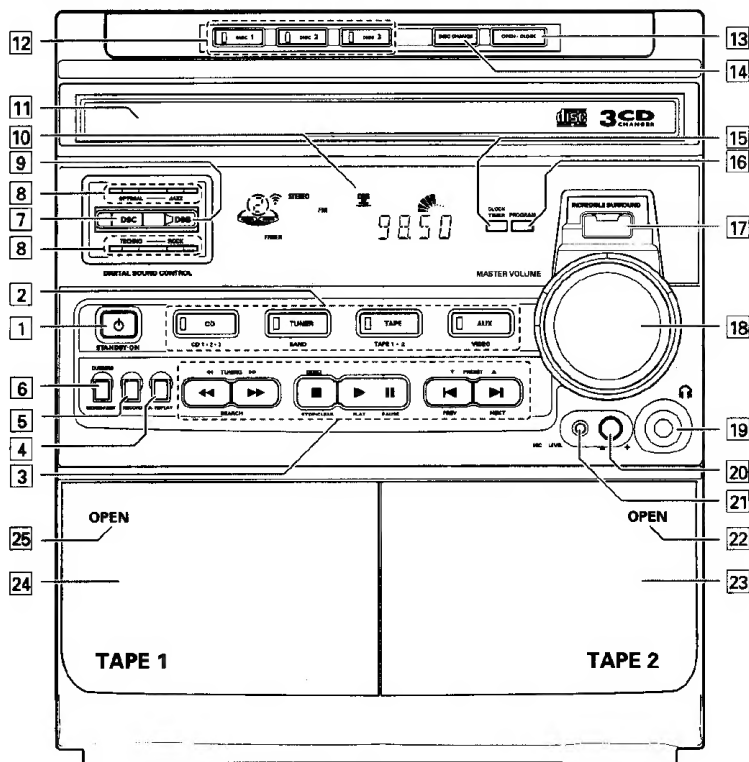
**Inserting batteries into the Remote Control**

- Insert the batteries (Type R06 or AA) into the remote control as shown in the battery compartment.



- To avoid damage from possible battery leakage, remove dead batteries or batteries that will not be used for a long time. For replacement, use type R06 or AA batteries.

## CONTROLS





## Controls on the system and remote control

### 1 STANDBY-ON

- to switch the system on or to standby mode.

### 2 SOURCE : to select the following.

#### CD / (CD 1•2•3)

- to select CD mode. When CD in stop mode; to select the disc tray 1, 2 or 3.

#### TUNER / (BAND)

- to select Tuner mode. When in tuner mode; to select the waveband: FM or MW.

#### TAPE / (TAPE 1•2)

- to select Tape mode. When tape in stop mode; to select either tape deck 1 or 2.

#### AUX / (VIDEO)

- to select sound from an external source (e.g. TV, Laser Disc, DVD or VCR player).

### 3 MODE SELECTION

#### SEARCH ◀▶ (TUNING ◀▶▶)

- for CD ..... to search backward/forward.

- for TUNER ..... to tune to a lower or higher radio frequency.

- for TAPE ..... to rewind or fast forward on tape deck 2 only.

### STOP•CLEAR ■ (DEMO)

- for CD ..... to stop CD playback or clear a program.

- for TUNER ..... to stop programming.

- for TAPE ..... to stop playback or recording.

- DEMO ..... to start or stop demonstration mode.

### PLAY ▶ / PAUSE II

- for CD ..... to start or interrupt playback.

- for TAPE ..... to start playback.

### PREV ◀ / NEXT ▶ (PRESET ▼▲)

- for CD ..... to skip to the beginning of the current or previous/next track.

- for TUNER ..... to select a preset station in memory.

### 4 AUTO REPLAY (available in tape deck 2 only)

- to select playback mode either in continuous AUTO PLAY or ONCE only.

### 5 RECORD

- to start recording on tape deck 2 only.

### 6 DUBBING

- to dub a tape in normal or fast speed.

### 7 DIGITAL SOUND CONTROL (DSC)

- to select the desired sound effect: OPTIMAL, JAZZ, ROCK or TECHNOC.

### 8 DIGITAL SOUND CONTROL

#### DISPLAY PANEL

- to view the selected DSC display.

### 9 DYNAMIC BASS BOOST (DBB)

- to switch on bass boost to enhance bass response or to switch off bass boost.

### 10 DISPLAY

- to view the current setting of the system.

### 11 CD CAROUSEL TRAY

### 12 CD DIRECT PLAY (DISC 1 / DISC 2 / DISC 3)

- to select a CD tray for playback.

### 13 OPEN•CLOSE

- to open or close the CD carousel tray.

### 14 DISC CHANGE

- to change CD(s).

### 15 CLOCK•TIMER

- to view clock, set clock or timer.

### 16 PROGRAM

- to program CD tracks in CD mode or preset radio stations in tuner mode.

### 17 INCREDIBLE SURROUND

- to switch on or off the surround sound effect.

### 18 VOLUME

- to adjust the volume level.

### 19

- to connect headphones.

### 20 MIC LEVEL (not available for version /30)

- to adjust the mixing level for karaoke or microphone recording.

### 21 MIC (not available for version /30)

- to connect microphones jack.

### 22 OPEN

- to open tape deck 2.

### 23 TAPE DECK 2

### 24 TAPE DECK 1

### 25 OPEN

- to open tape deck 1.

### 26 REPEAT

- to repeat a CD track.

### 27 SHUFFLE

- to play all the available discs and their tracks in random order.

### 28 MUTE

- to switch off the sound temporarily.

### 29

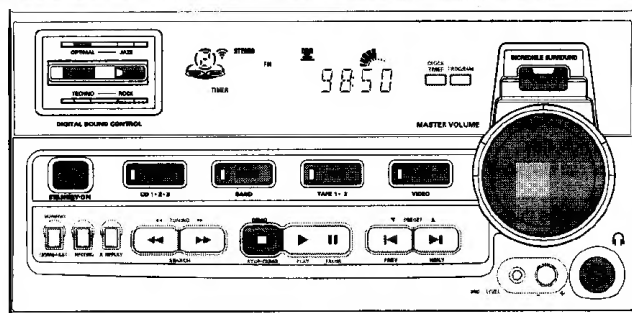
- to switch the system to standby mode.

#### Notes for remote control:

- First select the source you wish to control by pressing one of the source select keys on the remote control (e.g. CD, TUNER, TAPE 1/2 or AUX).

- Then select the desired function (PLAY, NEXT, etc.).

## OPERATING THE SYSTEM



#### Important:

Before you begin operating the system, complete the preparation procedures.

### Demonstration mode

The system has a demonstration mode that shows the various features offered by the system. **When the system is switched on for the first time, the demonstration mode will start automatically.**

#### Note:

- During the demonstration, if you press any source (or standby-on) button, the system will switch to the respective mode (or standby).
- When the system is switched to standby mode, the demonstration will resume five seconds later.

#### To stop the demonstration mode

- Press and hold **STOP•CLEAR ■** (on the system only) for **five seconds** when the system is in demonstration mode.
  - The demonstration will stop.
  - The system will switch to standby mode.

#### Note:

- Even though the AC power cord is removed from and reconnected to the wall socket, the demonstration will remain off until it is switched on again.

#### To start the demonstration mode

- Press and hold **STOP•CLEAR ■** (on the system only) for **five seconds** when the system is in standby mode.
  - The demonstration will begin.

### Easy Set

EASY SET allows you to store all available radio stations in a particular band (FM or MW) automatically.

- Press and hold **STANDBY•ON** (on the system only) for 5 seconds; when the system is in standby or demonstration mode.
  - "EASY SET" will be displayed and followed by "TUNER".
  - EASY SET will start with the last active band.
  - All available radio stations with sufficient signal strength will be stored or until 40 presets are filled.

#### Notes:

- When EASY SET is used, all previously stored stations will be erased.
- The last preset station will appear on the display when EASY SET is completed.

### Switching the system ON

- Press **STANDBY•ON** (on the system only), **CD**, **TUNER**, **TAPE** or **AUX**.

You can also switch on the system by pressing any one of the CD DIRECT PLAY buttons.

### Switching the system to standby mode

- Press **STANDBY•ON** again.
  - The system will switch to standby mode.

### Selecting the Source

- Press the respective source selection button: **CD**, **TUNER**, **TAPE** or **AUX**.
  - The display indicates the selected source.

#### Note:

- For an external source, make sure that you have connected the audio left and right OUT terminals of the external equipment (TV, VCR, Laser Disc or DVD player) to the AUX IN terminals.

### Sound Control

#### Volume Adjustment

Adjust **VOLUME** to increase or decrease the sound level.

#### For Personal Listening

Connect the headphones plug to the socket at the front of the system. The speakers will be muted.

**Digital Sound Control (DSC)**

The DSC feature enables you to enjoy special sound effects that have preset equalizer settings, providing the best music reproduction.

- Press **DIGITAL SOUND CONTROL (DSC)** to select OPTIMAL, JAZZ, ROCK or TECHNO.
  - The Digital Sound Control display panel will light up respectively.
  - "OPTIMAL, JAZZ, ROCK or TECHNO" will be displayed.

**Automatic DSC-DBB selection**

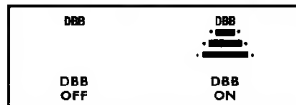
The best setting for the DBB is automatically generated for the respective DSC selection. You can manually select the DBB setting that best suits your listening environment.

DSC Selection	DBB On/Off
Optimal	On
Jazz	Off
Rock	Off
Techno	Off

**Dynamic Bass Boost (DBB)**

The DBB mode enhances the bass response.

- Press **DBB** to switch on bass response.
  - The DBB button lights up.
  - "DBB ON" will be displayed.

**To switch off DBB**

- Press **DBB** again.
  - The DBB button light is switched off.
  - "DBB OFF" will be displayed.

**Note:**

Some CDs or tapes might be recorded in high modulation. It may cause a distortion at high volume. If this occurs, switch off Incredible Surround, DBB or reduce the volume.

**Incredible Surround**

Normal stereo sound is determined by the distance between the front speakers. When Incredible Surround is switched on, it magnifies the virtual distance between the front speakers for an incredibly wide, enveloping, stereo effect.

- Press **INCREDIBLE SURROUND** to switch on.
  - The INCREDIBLE SURROUND button lights up.
  - "IS" will be displayed.

**To switch off Incredible Surround**

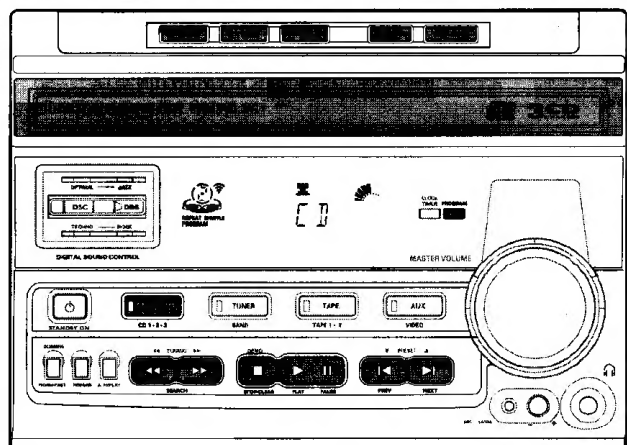
- Press **INCREDIBLE SURROUND** again.
  - The INCREDIBLE SURROUND button light is switched off.
  - "IS OFF" will be displayed.

**Mute (only on remote control)**

This feature allows you to temporarily switch off the sound of the system without switching off the system when you require a moment of silence.

- Press **MUTE** on the remote control to switch off the sound.
  - "MUTE" will be displayed.
- Press **MUTE** again on the remote control or increase the **VOLUME** level to switch on the sound.

11

**Warning!**

- This system is designed for conventional CDs. Do not use any accessories like disc stabilizer rings or CD treatment sheets, etc., which may damage the CD mechanism.
- Do not load more than one disc into each tray.
- When the CD changer is loaded with CD(s), do not turn over or shake the system. This may jam the changer.

You can load up to three discs in the CD changer for continuous playback without interruption.

**Discs for playback**

This system can play all audio CD, finalized audio CD-Recordable and finalized audio CD-Rewritable format discs.

**Loading the CD Changer**

- Press **CD** to select CD mode.
- Press **OPEN•CLOSE**.
  - The CD compartment slides out.
- Load a CD with the printed side up in the right tray.
  - You can load another disc in the left tray.
  - To load the third disc, press the **DISC CHANGE** button.
    - The CD changer carousel will rotate until the empty tray is at the right hand side and is ready for loading.
    - Playback will always start with the disc in the outer right disc tray.
- Press **OPEN•CLOSE** to close the CD compartment.
  - The total number of tracks and playing time of the last selected disc appear on the display.

**CD Direct Play**

You can play a CD directly by pressing the **DISC 1**, **DISC 2** or **DISC 3** button. The CD player will stop at the end of playback of the selected disc.

- When the button is lighted, it indicates that there is a disc loaded in the disc tray.

**Playing a CD**

- Press **PLAY** to start playback.
  - The disc tray, track number and elapsed playing time of the current track appear on the display.
  - To interrupt playback, press **PAUSE**.
    - The playing time flashes.
  - To resume playback, press **PLAY** again.
- To stop playback, press **STOP•CLEAR**.

**Note:**

All the available discs will play once, then stop. When the CD has stopped playing, the system will switch to the standby mode after 15 minutes if no button is pressed.

**Disc Change**

You can change the outer 2 discs while the third inner disc is at the stop or playing mode.

- Press **DISC CHANGE**.
  - The CD compartment slides out.
- Replaced the discs in the left and right disc trays.
  - If you press **DISC CHANGE** again during playback, the CD will stop playing.
    - The CD carousel tray will rotate until the inner tray is at the right hand side and is ready for changing.
- Press **OPEN•CLOSE** to close the CD compartment.

## Selecting a desired track

### Selecting a desired track at the stop mode

- 1 Press **PREV** ◀ or **NEXT** ▶ until the desired track appears on the display.
- 2 Press **PLAY** ▶ to start playback.
  - The selected track number and elapsed playing time appear on the display.

### Selecting a desired track during playback

- 1 Press **PREV** ◀ or **NEXT** ▶ until the desired track appears on the display.
  - The selected track number and elapsed playing time appear on the display.
- If you press **PREV** ◀ once it will skip to the beginning of the current track and play the track again.

### Searching for a particular passage during playback

- Press and hold ◀◀ or ▶▶ until the desired passage is located.
  - The volume will be reduced.
- Play returns to normal when ◀◀ or ▶▶ is released.

## Programming Tracks

Programming tracks of a loaded CD is possible in the stop mode. The display will indicate the total tracks stored in the program. Up to 40 tracks can be stored in the memory in any order. When 40 tracks are stored and you attempt to store another track, the display will show "PROGRAM FULL".

- 1 Load the desired discs in the disc trays.
- 2 Press **PROGRAM** to start programming.
  - The PROGRAM flag starts flashing.
- 3 Press the **CD** (CD 1•2•3) button to select the disc.
- 4 Press **PREV** ◀ or **NEXT** ▶ to select the desired track.
- 5 Press **PROGRAM** to store the track.
  - Repeat steps 3 to 5 to store other discs and tracks.
- 6 Press **STOP•CLEAR** ■ once to end programming mode.
  - The total number of tracks programmed and total playing time appear on the display.

#### Notes:

- If the total playing time is more than "99:59" or if one of the programmed tracks has a number greater than 30, then "----" appears in the display instead of the total playing time.
- During programming, if no button is pressed within 20 seconds, the system will exit program mode automatically.

## Playing the program

- 1 Press **PLAY** ▶ to start program playback.
  - "PLAY PROGRAM" appears on the display.
  - The track number and elapsed playing time of the current track will appear on the display.
  - If you press **REPEAT** during program playback, the current track will be played repeatedly.
    - The REPEAT and PROGRAM flags will be displayed.
- 2 Press **STOP•CLEAR** ■ to stop program playback.

#### Note:

- If you press any of the **CD DIRECT PLAY** button, the system will play the selected disc or track and the stored program will be ignored temporarily. The PROGRAM flag will also temporarily disappear from the display and then reappear when the playback for the selected disc ends.

## Reviewing the program

Reviewing of the program is only possible in the stop mode.

- Press **PREV** ◀ or **NEXT** ▶ repeatedly to review the programmed tracks.
- Press **STOP•CLEAR** ■ to exit review mode.

## Erasing the program (in the stop mode)

- Press **STOP•CLEAR** ■ on the system.
  - "PROGRAM CLEAR" will be displayed.

#### Note:

- The program will be erased when the system is disconnected from the power supply. If the CD carousel is opened, the tracks belonging to the outer two trays will be erased and the display will show "CLEAR".

## Repeat (only on remote control)

It will play the current track repeatedly.

- 1 Press **REPEAT** during CD playback.
  - "REPEAT TRACK" will be displayed.
  - The REPEAT flag appears on the display.
  - The track will now be played repeatedly until you press **STOP•CLEAR** ■.
- 2 Press **REPEAT** again to resume normal playback.
  - The REPEAT flag disappears from the display.

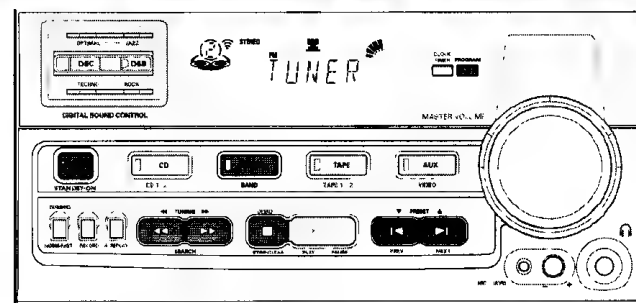
13

## Shuffle (only on remote control)

It will play all the available discs and their tracks in random order. Shuffle may also be used when tracks are programmed.

### To shuffle all the discs and tracks

- 1 Press **SHUFFLE**.
  - "SHUFFLE" will be displayed.
  - The SHUFFLE flag, the disc and the track selected at random appear on the display.
  - The discs and the tracks will now be played in random order until you press **STOP•CLEAR** ■.
  - If you press **REPEAT** during shuffling, the current track will be played repeatedly.
    - The REPEAT and SHUFFLE flags will be displayed.
- 2 Press **SHUFFLE** again to resume normal playback.
  - The SHUFFLE flag disappears from the display.



## Easy Set

EASY SET allows you to store all available radio stations in a particular band (FM or MW) automatically.

- Press and hold **STANDBY•ON** (on the system only) for 5 seconds; when the system is in standby or demonstration mode.
  - "EASY SET" will be displayed and followed by "TUNER".
  - EASY SET will start with the last active band.
  - All available radio stations with sufficient signal strength will be stored or until 40 presets are filled.

#### Notes:

- When EASY SET is used, all previously stored radio stations will be erased.
- The last preset radio station will appear on the display when EASY SET is completed.

## Tuning to radio stations

- 1 Press **TUNER** to select TUNER mode.
  - "TUNER" will be displayed.
  - A few seconds later, the current frequency or the radio station name if available will be displayed.
- 2 Press **TUNER** (BAND) again to select the desired waveband: FM or MW.
- 3 Press **TUNING** ◀◀ or ▶▶ for more than one second, then release.
  - The display will show "SEARCH" until a radio station with sufficient signal strength is found.
  - Repeat this procedure until the desired station is reached.
  - To tune to a weak station, briefly press **TUNING** ◀◀ or ▶▶ until the display shows the desired frequency and/or when the best reception has been obtained.

## Storing Preset Stations

You can store up to 40 radio stations in the memory. When a preset radio station is selected, the preset number appears next to the frequency on the display.

### Automatic programming

- 1 Press **TUNER**.
  - 2 Press **TUNER (BAND)** again to select the desired waveband: FM or MW.
  - 3 Press **PROGRAM** for more than one second.
    - PROGRAM flag starts flashing and 'AUTO' will be displayed.
    - Every available station for the selected waveband will be stored automatically. The frequency and preset number will be displayed briefly.
    - The system will stop searching when all the available radio stations are stored or when the memory for 40 preset radio stations is used.
    - The system will remain tuned to the last stored preset radio station.
- Repeat the above procedure to store other preset radio stations for the other waveband. Remember to select the next available preset number before proceeding. If not, some of the preset radio stations may be erased.

### Notes

- You can cancel the automatic programming by pressing **PROGRAM** or **STOP•CLEAR** on the system only. If you want to reserve a section of preset numbers, for example preset numbers 1 to 9, select preset 10 before starting automatic programming. Now only the preset numbers 10 to 40 will be programmed.

### Manual programming

- 1 Press **TUNER**.
  - 2 Press **TUNER (BAND)** to select the desired waveband: FM or MW.
  - 3 Press **PROGRAM** for less than one second.
    - PROGRAM flag, the frequency and preset number start flashing.
    - The next available preset number will be displayed for selection.
  - 4 Press **TUNING** ◀ or ▶ to tune to the desired frequency.
    - If you wish to store the radio station to another preset number, press **PRESET** ▼ or ▲ to select the desired preset number.
  - 5 Press **PROGRAM** again.
    - PROGRAM flag will stop flashing, and the radio station will be stored.
- Repeat the above procedure to store other preset radio stations.

### Notes:

- When 40 radio stations are stored and you attempt to store another radio station, the display will show "PROGRAM FULL". If you want to change an existing preset number, repeat steps 4 and 5.
- You can cancel manual programming by pressing **STOP•CLEAR** on the system only.
- During programming, if no button is pressed within 20 seconds, the system will exit program mode automatically.

## Tuning to Preset Radio Stations

- Press **PRESET** ▼ or ▲ to select the desired preset number.
  - The preset number, frequency and waveband appear on the display.

## Changing the MW tuning grid (or version /21/21M only)

The frequency step can be changed if necessary. In North and South America, the frequency step between adjacent channels in the MW band is 10 kHz. In other parts of the world, it is 9 kHz. The frequency step preset in the factory is 9 kHz.

### For MW Band

To change from 9 kHz to 10 kHz or vice versa

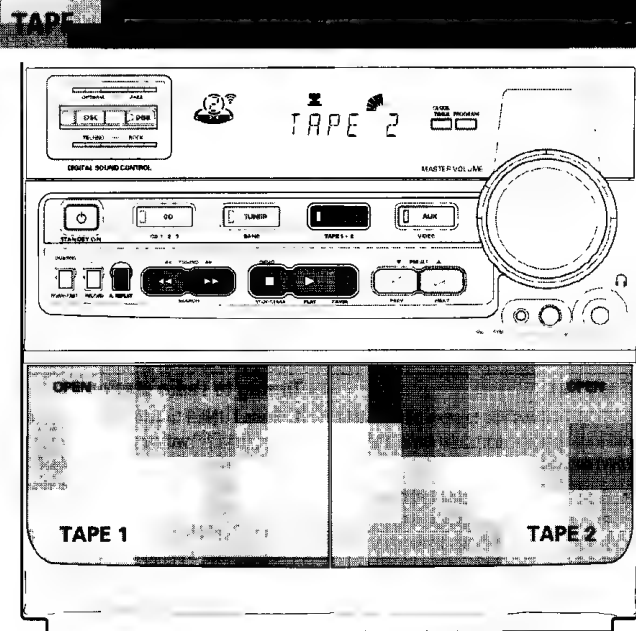
## Changing of tuning grid will erase all previously stored preset stations.

- 1 Disconnect the system from the AC power supply (pull out the AC power cord).
- 2 Press and hold **TUNER** and **TUNING** ▶▶ while reconnecting the system to the AC power supply.
  - Display will show "GRID 10" or "GRID 9".

### Notes:

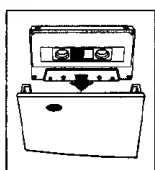
- GRID 9 indicates that the tuning grid is in step of 9 kHz in MW band. GRID 10 indicates that the tuning grid is in step of 10 kHz in MW band.
- FM tuning grid will also be changed from 50 kHz to 100 kHz or vice versa. All preset stations will also be erased.

15



## Loading a tape

- Press **OPEN**.
- The tape deck door opens.
- Load the tape with the open side downward and the full spool to the left.
- Close the tape deck door.



## Tape Playback

- 1 Press **TAPE** (TAPE 1•2) to select TAPE mode.
  - "TAPE 1" or "TAPE 2" will be displayed.
- Press **TAPE** (TAPE 1•2) again to select either tape deck 1 or tape deck 2.
- 2 Load the tape into the selected tape deck.
- 3 Press **PLAY** ▶ to start playback.
- 3a (For Tape Deck 2 only) Press **A. REPLAY** to select the different type of play mode (see auto replay).
- 4 Press ■ to end playback.

### Note.

- When the tape has stopped playing, the system will switch to the standby mode automatically after 15 minutes if no button is pressed.

## Auto Replay (only on tape deck 2)

- Press **A. REPLAY** to select either continuous AUTO REPLAY or ONCE during tape playback.
  - "AUTO REPLAY" or "ONCE" will be displayed.

### Notes:

- This feature is available during tape playback only.
- When "AUTO REPLAY" is selected, the tape will rewind automatically at the end of playback for the selected side. Then it will start playing again. It will replay up to a maximum of 20 times or when you press ■.
- When "ONCE" is selected, the tape will play the selected side once and then stop.

## Rewind/Fast Forward (only on tape deck 2)

### At the stop mode

- 1 You can rewind or fast forward the tape by pressing ◀◀ or ▶▶ respectively.
  - "◀◀" or "▶▶" will be displayed depending on which button is pressed.
  - The tape will stop automatically at the end of the rewinding or fast forwarding.

- 2 Press ■ to stop rewind or fast forward.

### During playback

- Press and hold ◀◀ or ▶▶ respectively until the desired passages are located.
  - During searching, the sound is reduced to a low volume.
  - When you release ◀◀ or ▶▶, the tape continues playing.

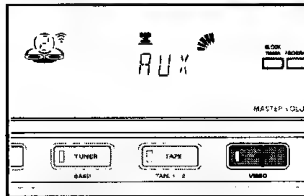
## TAPE

## AUX

## KARAOKE

## Notes:

- During rewinding or fast forwarding of a tape, it is possible to select another source (e.g. CD, TUNER or AUX).
- Check and tighten slack tape with a pencil before use. Slack tape may get jammed or may burst in the mechanism. C-120 tape is extremely thin and is easily deformed or damaged. It is not recommended for use in this system.
- Store the tapes at room temperature and do not put them too close to a magnetic field (for example, a transformer, TV or loudspeaker boxes).



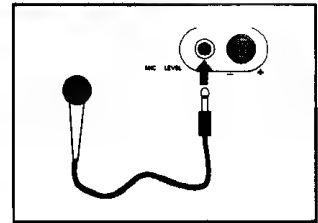
## Selecting External Equipment

If you have connected the audio out terminals of the external equipment (TV, VCR, Laser Disc or DVD player) to the AUX IN terminals, you can hear the enhanced sound from the system.

- Press **AUX** to select the external mode  
→ "FLUX" will be displayed.

## Note:

- All the sound control features (e.g. DSC, DBB, etc.) are available for selection.

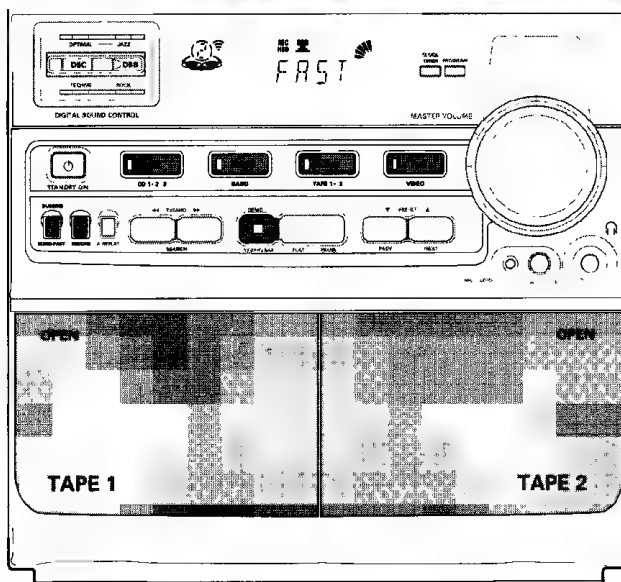


## Microphone Mixing (for version / 21/21M only)

- 1 Set the **MIC LEVEL** control to the minimum level to prevent acoustic feedback (e.g. a loud howling sound) before you connect the microphone
- 2 Connect a microphone to the **MIC** socket.
- 3 Press **CD, TUNER, TAPE** or **AUX**.
- 4 Play the selected source.
- 5 Adjust the volume level with **VOLUME** control.
- 6 Adjust the **MIC LEVEL** control to the mixing level that you want.
- 7 Start singing or talking through the microphone

17

## RECORDING



## Notes:

- For recording, use only tape of IEC type I (normal tape) or IEC type II (Chrome).
- The tape is secured at both ends with leader tape. At the beginning and end of tape, nothing will be recorded for six to seven seconds.
- The recording level is set automatically, regardless of the position of Volume, DBB or Incredible Surround.
- To prevent accidental recording, break out the tab on the left shoulder of the tape side that you want to protect.
- If "CHECK TAPE" is displayed, the protection tab has been broken. Put a piece of clear adhesive tape over the opening. Do not cover the Chrome tape detection hole when covering the tab opening.

## One Touch Recording

- For One Touch Recording, as soon as you press **RECORD**, the current source will be recorded on tape deck 2

- 1 Load a blank tape in tape deck 2.
- 2 Press **RECORD** to start recording.  
→ REC flag starts flashing
- 3 Press **■** to stop recording

## Note:

- When you press **RECORD** at **TAPE** mode, "SELECT OTHER SOURCE" will be displayed. One Touch Recording is not possible at **TAPE** mode.

## Dubbing tapes (from tape deck 1 to tape deck 2)

- 1 Press **TAPE** to select tape deck 2.
- 2 Load the prerecorded tape into tape deck 1 and a blank tape into tape deck 2  
→ Make sure that the tape in tape deck 1 has its full spool to the left.
- 3 Press **DUBBING** once for normal speed dubbing or **twice** within 2 seconds for high speed dubbing  
→ "NORMAL" (normal speed) or "FAST" (high speed) will be displayed and then followed by "DUBBING".  
→ HSD flag appears on the display for high speed dubbing.
- Dubbing will start immediately  
→ REC flag starts flashing.
- 4 Press **■** to stop dubbing.

## Notes:

- At the end of side A, flip the tapes to side B and repeat the procedure.
- Dubbing of tapes is only possible from tape deck 1 to tape deck 2.
- To ensure good dubbing, use tapes of the same length.
- During high speed dubbing in **Tape** mode, the sound is reduced to a low volume.
- You can switch to other source while dubbing.

## RECORDING

## CLOCK

**CD Synchro Start Recording**

- 1 Load a blank tape into tape deck 2 and a disc into the disc tray.
- 2 Press **CD** to select CD mode.
  - You can program the tracks in the order you want them to be recorded (see Programming Tracks). If not, the tracks are recorded according to the selected disc.
- 3 Press **RECORD** to start recording.
  - REC flag starts flashing.
- CD will start playback automatically.
- 4 Press **■** to stop recording.

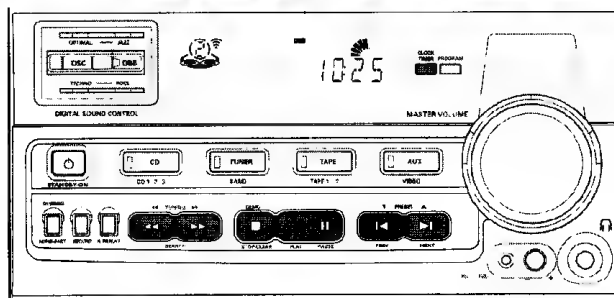
**Recording from other sources**

(only on tape deck 2)

- 1 Load a blank tape into tape deck 2
- 2 Press **CD**, **TUNER** or **AUX**
  - Start playback of the selected source.
- 3 Press **RECORD** to start recording.
  - REC flag starts flashing.
- 4 Press **■** to stop recording

**Note:**

- During recording, it is not possible to listen to another sound source.

**View Clock**

You can view the clock (if it is set) at standby or any source mode. It will be displayed for about 7 seconds.

- Press **CLOCK•TIMER** briefly.
  - "10:25" (the current time) will be displayed.
  - "----" will be displayed if the clock is not set.

**Clock Setting**

The clock is set in 24-hour mode, e.g. "00:00" or "23:59". Before setting the clock, you must be in the View Clock mode

- 1 Press **CLOCK•TIMER** to select clock mode
  - "00:00" or the current time starts flashing.
  - "◀▶", "◀▶", "▶▶", "■" light up
- 2 Set the hour with ◀▶ or ▶▶.
- 3 Set the minute with ◀▶ or ▶▶.
- 4 Press **CLOCK•TIMER** again to store the setting.
  - The clock starts running.
- To exit without storing the setting, press **■**.

**Notes:**

- During clock setting, if no button is pressed within 90 seconds, the system will exit clock setting mode automatically.
- When a power interruption occurs, the clock setting is erased

19

## TIMER

**Timer Setting**

- The system can switch on to CD, TUNER or TAPE mode automatically at a preset time. it can serve as an alarm to wake you up. After half an hour from the preset time, the system will return to the standby mode if no button is pressed.
- Before setting the timer, make sure the clock is set correctly.
- The timer will always be switched on once it is set.
- **The volume of the timer will be at the last setting before the set is switched to standby mode.**

- 1 Press and hold **CLOCK•TIMER** for more than 2 seconds to select timer mode.
  - "00:00:00" or the last set timer starts flashing. The TIMER flag flashes.
  - The last selected source is lighted while other available sources are flashing.
  - "◀▶", "▶▶", "▶▶", "■" light up
- 2 Press **CD**, **TUNER** or **TAPE** to select the desired source.
- 3 Press ◀▶ or ▶▶ to set the hour for the timer to start.
- 4 Press ◀▶ or ▶▶ to set the minute for the timer to start
- 5 Press **CLOCK•TIMER** to store the start time.
  - The TIMER is now set.
  - The TIMER flag remains on the display.

- To exit without storing the setting, press **■**.
- At the preset time, the TIMER will be activated.
  - The selected source will be played.

**Notes:**

- During timer setting, if no button is pressed within 90 seconds, the system will exit timer setting mode automatically.
- If the source selected is TUNER, the last tuned frequency will be switched on.
- If the source selected is CD, playback will begin with the first track of the last selected disc. If the CD trays are empty, the TUNER will be selected instead.
- If the source selected is TAPE, and if the preset time is reached during high speed dubbing, the TUNER will be selected instead.

**To cancel the TIMER**

- 1 Press **CLOCK•TIMER** for more than 2 seconds
- 2 Press **■** to cancel the timer.
  - "CANCEL" will be displayed.
  - The TIMER flag disappears from the display

**To start the TIMER again (for the same time)**

- 1 Press **CLOCK•TIMER** for more than 2 seconds.
- 2 Press **CLOCK•TIMER** again to store the start time and the selected source

## MAINTENANCE

### Maintenance

#### Cleaning the Cabinet

- Use a soft cloth slightly moistened with a mild detergent solution. Do not use a solution containing alcohol, spirits, ammonia or abrasives.

#### Cleaning Discs

- When a disc becomes dirty, clean it with a cleaning cloth. Wipe the disc from the center out.
- Do not use solvents such as benzene, thinner, commercially available cleaners, or antistatic spray intended for analog records.



#### Cleaning the CD lens

- After prolonged usage, dirt or dust may accumulate at the CD lens. To ensure good playback quality, clean the CD lens with Philips CD Lens Cleaner or any commercially available. Follow the instructions supplied with the Lens Cleaner.

#### Cleaning the Heads and the Tape Paths

- To ensure good recording and playback quality, clean the heads, the capstan(s), and pressure roller(s) after every 50 hours of tape operation.
- Use a cotton swab slightly moistened with cleaning fluid or alcohol.
- You can also clean the heads by playing a cleaning tape through once.

#### Demagnetizing the heads

- Use a demagnetizing tape available at your dealer.

21

## TROUBLESHOOTING

**Warning!** Under no circumstances you should try to repair the set yourself as this will invalidate the guarantee. Do not open the set as there is a risk of electric shock.

- If a fault occurs, check the points listed below before taking the system for repair.
- Should any problems persist after you have made these checks, consult your nearest dealer or service center.

### CD Player Operation

#### "NO DISC" is displayed.

- The disc is inserted upside down.
- Place CD with printed side up.
- Moisture condensation at the lens.
- Wait until lens has adjusted to normal room temperature
- There is no disc in the CD tray.
- Insert a CD.
- The CD is dirty, badly scratched or warped.
- Clean or replace the CD.
- The CD lens is dirty or dusty
- See section under Maintenance.

#### "DISC NOT FINALISED" is displayed.

- The CD-RW or CD-R disc is not properly recorder for the use of a standard CD player.
- Read the instruction booklet of your CD-Rewritable or CD-Recorder on how to finalize a recording.
- The CD is badly scratched or dirty.
- Replace or clean CD.

### Radio Reception

#### Poor radio reception

- The signal strength is too weak
- Adjust the antenna.
- The TV or VCR is too close to the stereo system.
- Separate the stereo system from the TV or VCR.
- Connect an external antenna for better reception.

### Tape Deck Operation

#### "RECORDING ACTIVE" is displayed.

- A recording is in progress
- Stop the recording or wait until it is finished.

#### "TAPE DUBBING ONLY" is displayed.

- Tape dubbing is only possible in tape mode
- Switch source to tape mode

#### Recording or playback cannot be made or there is a decrease in audio level.

- Dirty tape heads, capstans or pressure rollers.
- See section on tape deck maintenance
- Magnetic build-up in the record/playback head.
- Use demagnetizing tape.

### General

#### System does not react when any button is pressed.

- Electrostatic discharge
- Press **STANDBY-ON** to switch the system off. Remove the AC power plug from the wall outlet, then reconnect and switch on the system again.

#### No or poor sound.

- Volume is not turned up.
- Adjust **VOLUME**.
- The system is muted.
- Press **MUTE** to switch on the sound.
- The headphones are connected.
- Disconnect the headphones
- Speakers are not connected or are connected wrongly.
- Check that the speakers are connected correctly.
- Make sure that the stripped speaker wire is clamped.

#### Reversed left and right sound.

- Speakers are connected wrongly.
- Check the speaker connections and location

#### Lack of bass sound or apparently imprecise physical location of musical instruments.

- Speakers are connected wrongly.
- Check the speaker connection for proper phasing, red/black wires to red/black terminals.

#### Remote control has no effect on the system.

- The distance to the system is too large
- Reduce the distance.
- Batteries are inserted incorrectly.
- Insert the batteries with their polarities (+/- signs) as indicated.
- Batteries are exhausted.
- Replace the batteries.
- Wrong source is selected.
- Select the source (CD, TUNER, etc.) before pressing the function button, (PLAY, PREV/NEXT, etc.).

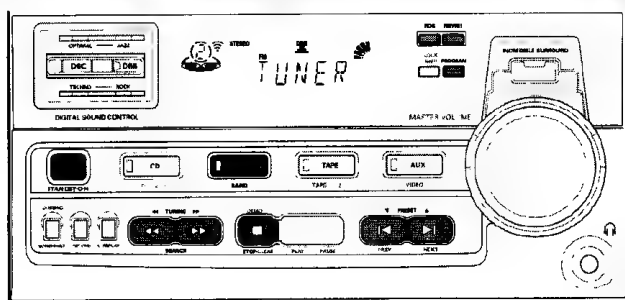
#### Timer not working.

- Timer is not switched on.
- Press **CLOCK/TIMER** to switch on the timer
- Dubbing/recording is in progress.
- Stop dubbing/recording

#### System displays features automatically; buttons flash continuously.

- Demonstration mode is switched on
- Press and hold **■** for 5 seconds to switch off the demonstration.

## ADDITIONAL FEATURES (FOR /22/34 VERSIONS)



### Easy Set (only in Standby or Demonstration mode)

EASY SET allows you to store all available radio stations in a particular band (FM, MW or LW) automatically.

- 1 Press and hold **STANDBY-ON** (on the system only) for 5 seconds; when the system is in standby or demonstration mode.
  - "EASY SET" will be displayed and followed by "TUNER".
  - EASY SET will start with the last active band.
  - All available radio stations with sufficient signal strength will be stored or until 40 presets are filled.
- 2 The system will search once again for the first available RDS station and to set the RDS time automatically.

- When searching RDS station;
  - "SEARCH RDS STATION" will be displayed. If no RDS station is available, the program will exit automatically and "NO RDS STATION" will be displayed.
  - After a station is found, "EASY SET" will be displayed and followed by "TIME".
- When searching RDS time,
  - "SEARCH RDS TIME" will be displayed.
  - When RDS time is read, "RDS TIME" will be displayed. The current time is displayed for 2 seconds and will be stored automatically.

#### Notes:

- When EASY SET is used, all previously stored radio stations will be erased.

- The last preset radio station or the first available RDS station will appear on the display when EASY SET is completed.
- If RDS station does not transmit RDS time within 90 seconds, the program will exit automatically and the display will show "NO RDS TIME".

### Receiving RDS radio station

RDS (Radio Data System) is a broadcasting service that allows FM stations to send additional information along with the regular FM radio signal. This additional information can contain.

- **STATION NAME:** The station name is displayed.
- **FREQUENCY:** The frequency of the station is displayed.
- **PROGRAM TYPE:** The following program types exist and can be received by your tuner: News, Affairs, Info, Sport, Educate, Drama, Culture, Science, Varied, Pop M, Rock M, M.O.R. (middle of the road music), Light M, Classics, Other M, No type
- **RADIO TEXT (RT):** text messages appear in the display.

When you have tuned to a RDS station, the RDS logo (RDS icon) and the station name will appear on the display.

- The display normally shows the radio station name if available. By repeatedly pressing **RDS** button you can change the type of display information:
  - The display shows in turn: STATION NAME → FREQUENCY → PROGRAM TYPE → RADIO TEXT → STATION NAME ...

#### Note:

When you press the **RDS** button and the display shows "NO RDS", it indicates that either the tuned station is not transmitting RDS signal or it is a non RDS station.

### RDS Time

Some RDS station may be transmitting a real time clock at an interval of every minute.

#### Setting the time with RDS clock

- 1 Press **CLOCK/TIMER**
  - "----" or current time appears on the display
- 2 Press **CLOCK/TIMER** once more to enter clock setting mode.
  - "00:00" or current time starts flashing.
- 3 Press **RDS**.
  - The message "SEARCH RDS TIME" will be displayed.
  - If the station does not transmit RDS clock, "NO RDS TIME" will be displayed.

- When the RDS clock is read, "RDS TIME" will be displayed. The current clock time is displayed for 2 seconds and will be stored automatically.

### News (only available in Radio Station with RDS)

You can activate NEWS function in Standby or any source mode except Tuner mode. Once the News PTY (program type) is detected in a RDS station, it will switch to TUNER mode automatically.

#### To start NEWS function

- 1 Press **NEWS**.
  - The NEWS flag and "NEWS ON" will be displayed.
  - It will search for the first available RDS station in the presets and wait for the News PTY (program type) to be available. During News PTY search:
    - If **NEWS** activate from Standby or Demo mode, the display will show "WAITING FOR NEWS".
    - If **NEWS** is activated from CD, Tape or Aux mode, the current source activity will remain uninterrupted.
    - If no RDS stations found after the search, the News function will be switched off. The display will show "NO RDS NEWS" and NEWS flag will disappear from the display.

- When News transmission is detected, the system will switch to Tuner mode.
  - The NEWS flag starts flashing.
- After News has ended, the last selected source mode will be resumed.
  - The NEWS flag will disappear from the display

#### To cancel NEWS function

- Press **NEWS** again
  - The NEWS flag disappears and "NEWS OFF" will be displayed.

#### Notes:

- During NEWS bulletin, you can press any available source button to cancel NEWS function and execute the relevant source mode.
- The NEWS works only once for each activation.
- If NEWS is activated from Standby or Demonstration mode, it switches to Tuner mode and the sound will be muted until News is available.



## DISMANTLING INSTRUCTIONS

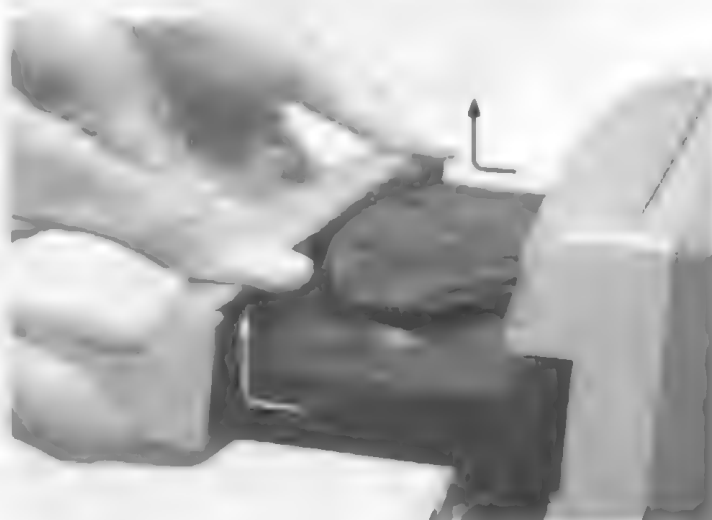
### *Dismantling of the Cassette Cover*



Cassette door

### *Dismantling of the Front Panel*

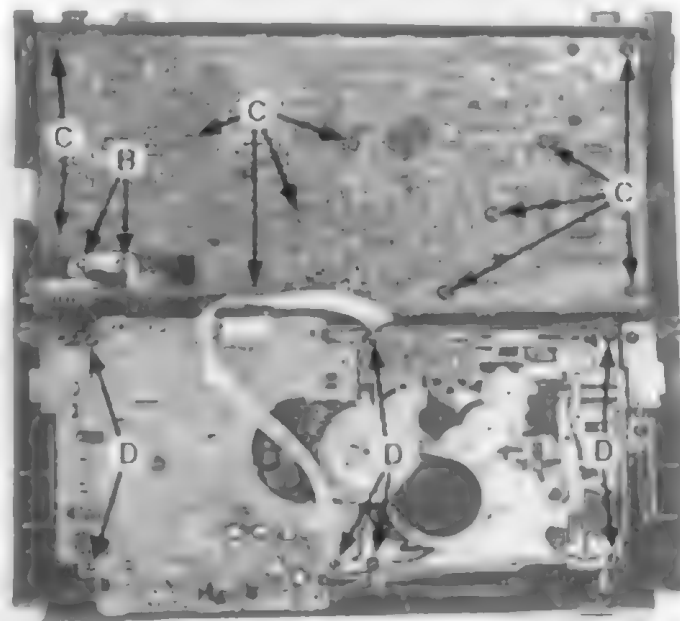
- 1) Slide out the tray and remove the CDC front cover as indicated
- 2) Loosen the 8 screws to separate the Front Panel from the rear portion
  - 2 screws A on the front
  - 2 screws each on the left & right side
  - 2 screws at the bottom



Front CDC Portion

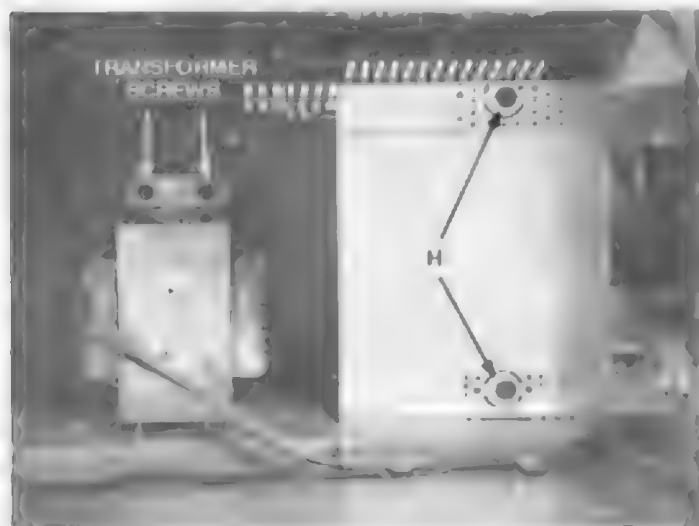
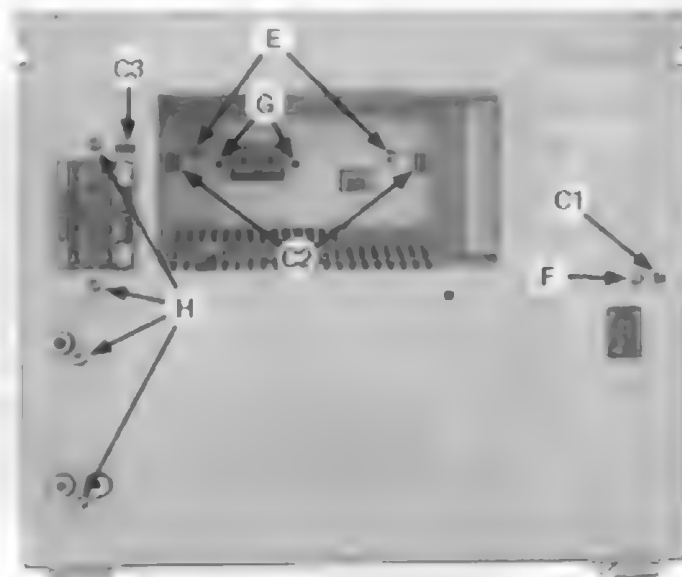
### *Dismantling of Assemblies on the Front Panel*

- 1) Remove 2 screws B to loosen the Karaoke\* / Headphone board  
 \*Note: Only 1 screw B for non-Karaoke version
- 2) Remove 11 screws C as indicated to loosen the Front board
- 3) Remove 7 screws D to loosen the ETF Module

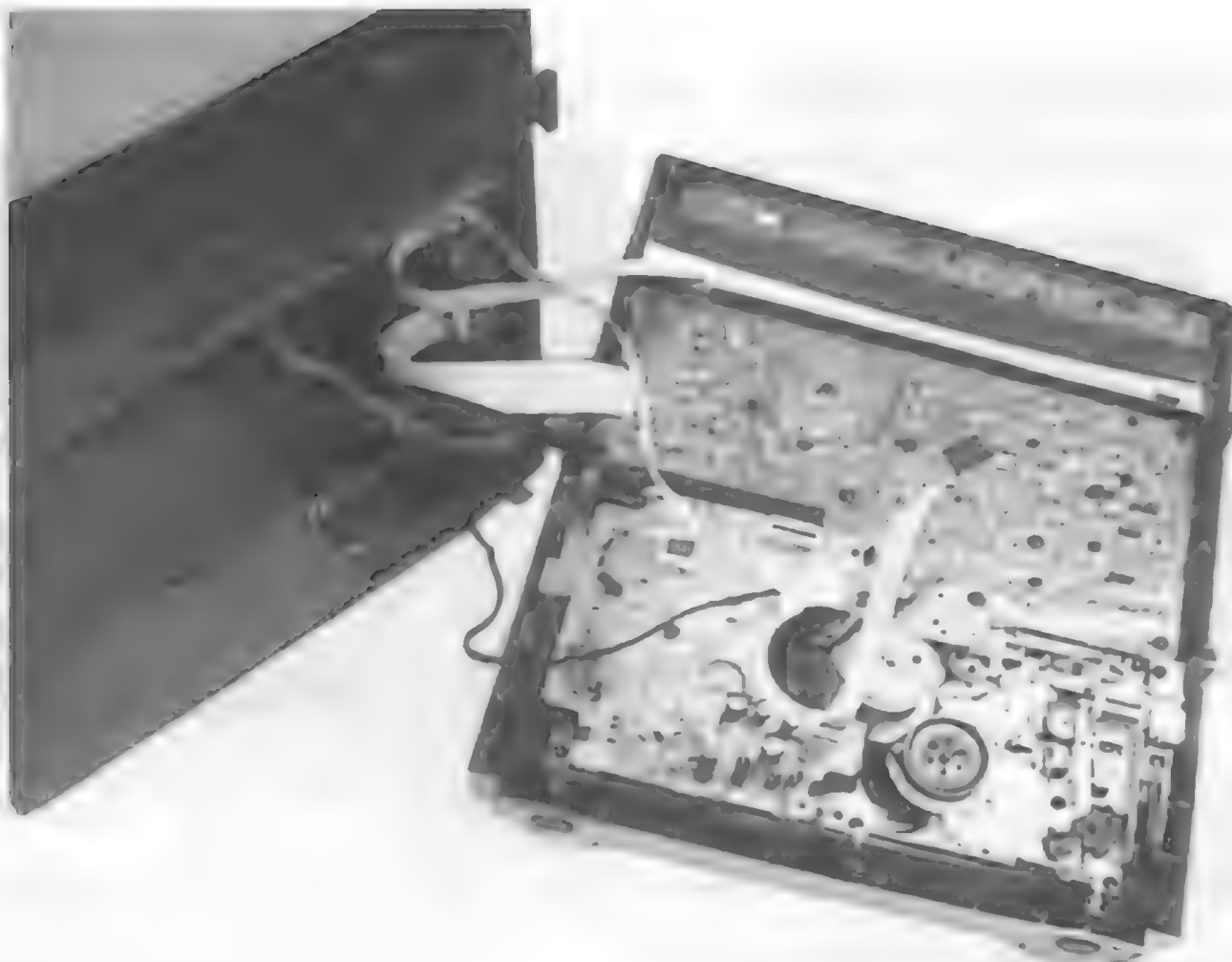


### *Dismantling of Rear Portion*

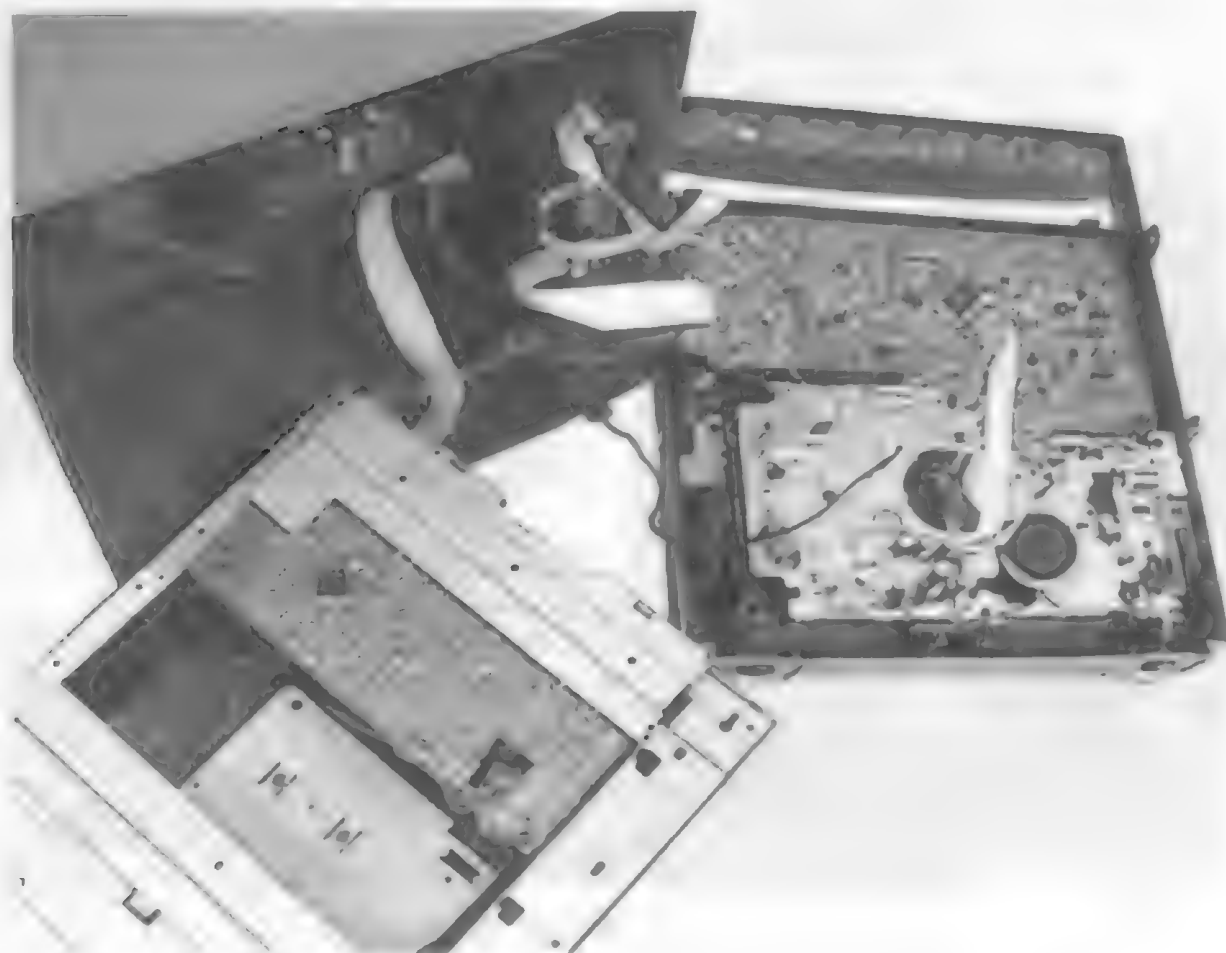
- 1) Remove 1 screw F & uncatch C1 to loosen the Mains socket pc board
- 2) Remove 2 screws E, 2 screws G\* and uncatch C2 to loosen the Tuner pc board assembly.  
 \*Note: Screws G will be deleted after the holes on the rear cabinet are removed.
- 3) Remove 6 screws H (4x on the rear and 2x on the heatsink) & uncatch C3 to loosen the Combi board (Main part)

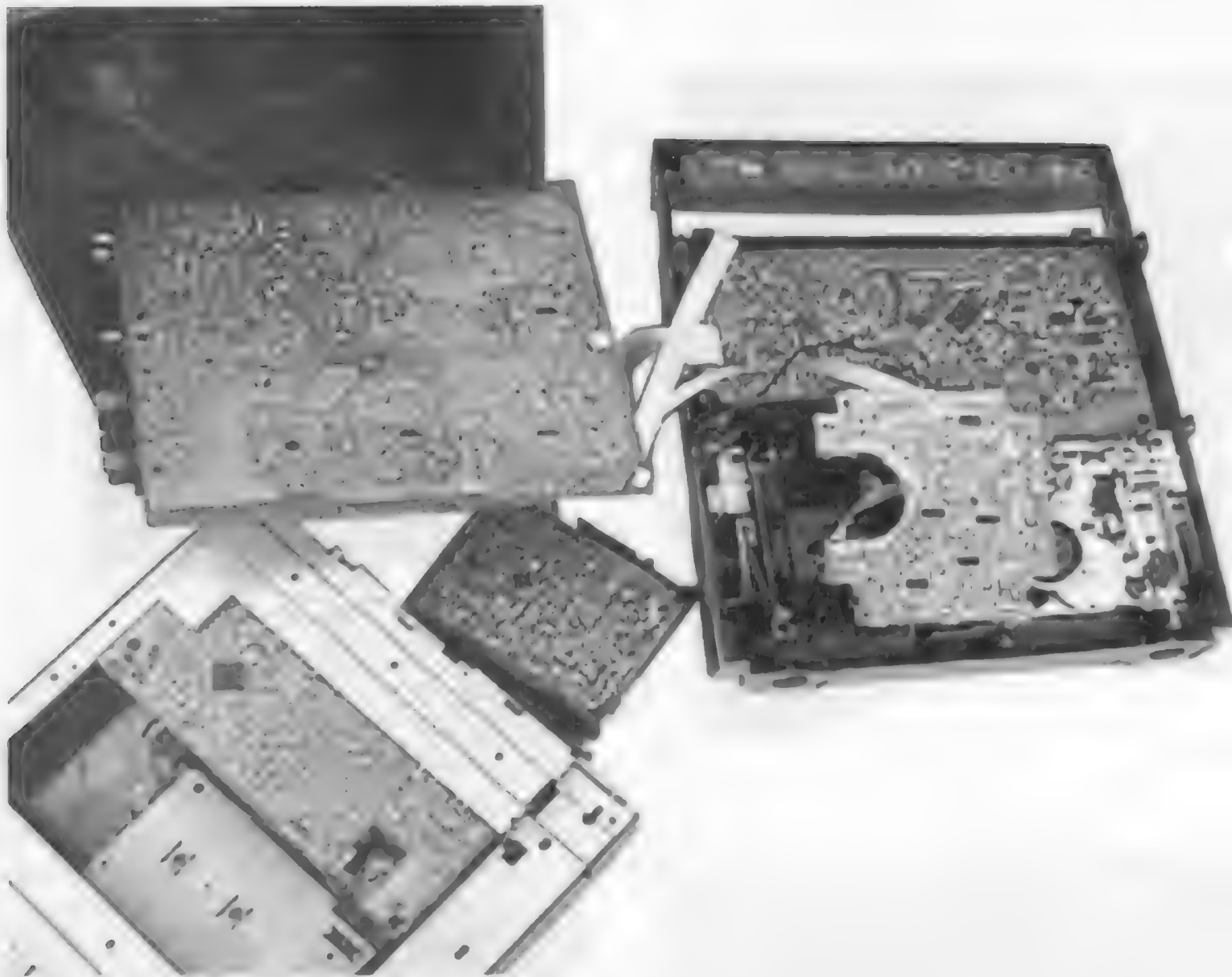


Service pos A



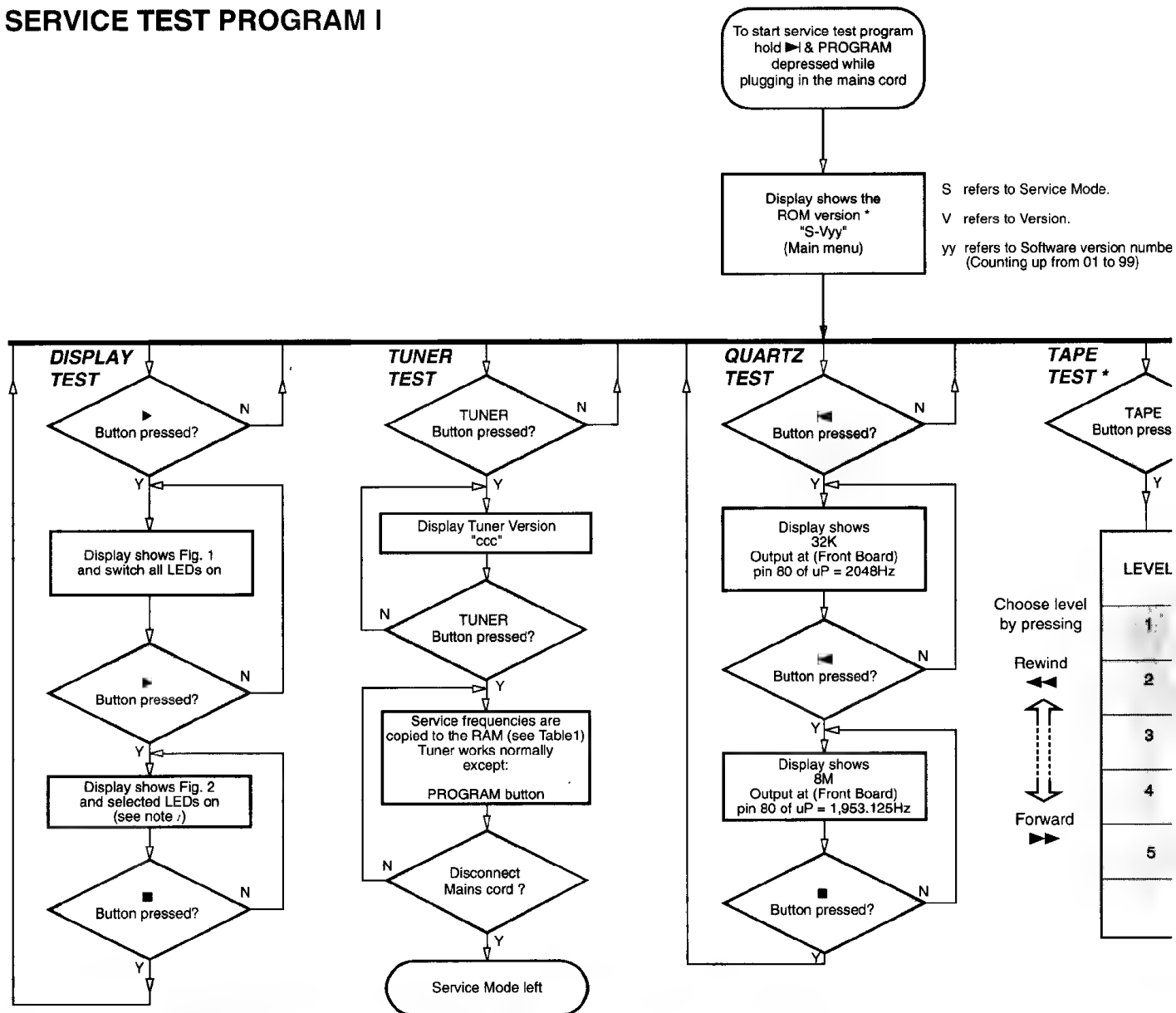
Service pos B





**Note:** The flex cables are very fragile, care should be taken not to damage them during repair. After repair, be very sure that the flex cables are inserted properly into the flex connectors before encasing. otherwise faults may occurs

# SERVICE TEST PROGRAM I



PRESET	Europe "EUR"	East Eur. "EAS"	East Eur. Extended-band "EAS"	USA "USA"	Oversea "OSE"
1	87.5MHz	87.5MHz	65.81MHz	87.5MHz	87.5MHz
2	108MHz	108MHz	108MHz	108MHz	108MHz
3	531kHz	531kHz	74MHz	530kHz	531/530kHz
4	1602kHz	1602kHz	87.5MHz	1700kHz	1602/1700kHz
5	558kHz	558kHz	531kHz	560kHz	558/560kHz
6	1494kHz	1494kHz	1602kHz	1500kHz	1494/1500kHz
7	153kHz	87.5MHz	558kHz	98MHz	87.5MHz
8	279kHz	87.5MHz	1494kHz	87.5MHz	87.5MHz
9	198kHz	87.5MHz	98MHz	87.5MHz	87.5MHz
10	98MHz	87.5MHz	70.01MHz	87.5MHz	87.5MHz
11	87.5MHz	98MHz	65.81MHz	87.5MHz	98MHz

Table 1

## East Europe TUNER IF offset correction

- 1) Input a reference frequency 87.5MHz from the generator.
- 2) Proceed to the Tuner Test Mode
- 3) Hold TUNER button down for > 3 seconds
- 4) The set will self-calibrate automatically and display "OFS-xx" when calibration is successful, otherwise it will display "00E".

xx : offset value between -3 to +3

Note: This has to be done whenever the Eeprom, Microprocessor or the components in the oscillator circuitry are replaced.



note 1: CDC1, Cf

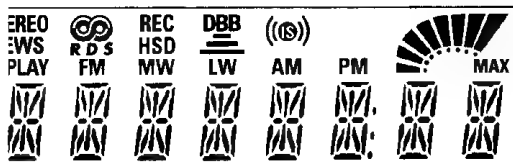
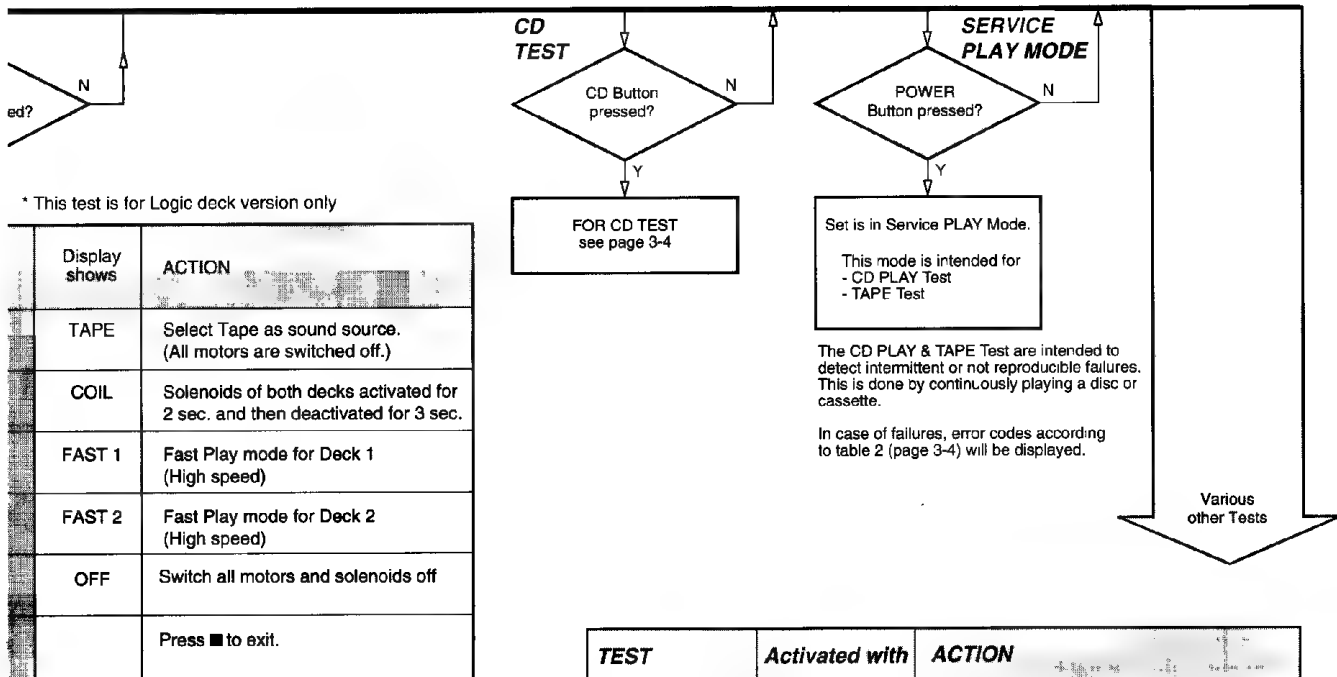
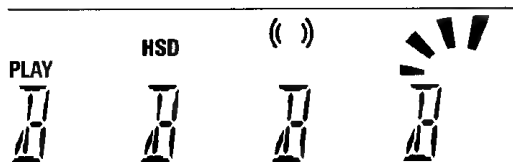
r of  $\mu$ Processor.

Figure 1



DC3, CD, Tape, Aux, ◀◀, ■ and ▶.

Figure 2

TEST	Activated with	ACTION
EEPROM TEST	▶▶ ■ to Exit	A test pattern will be sent to the EEPROM. "PASS" is displayed if the $\mu$ Processor read back the test pattern correctly, otherwise "ERROR" will be displayed.
EEPROM FORMAT	◀◀	Load default data. Display shows "NEW" for 1 second. <b>Caution!</b> All presets from the customer will be lost!!
KEY TEST	▶ ■ to Exit	Key numbers according table 3 are shown on the display. (see Chapter 3-4)
FAST CLOCK TEST	CLOCK/TIMER	The clock is switched to fast mode. "FAST" is displayed for 1 sec.  Press CLOCK/TIMER again to reset the clock to normal. "NORMAL" displayed for 1 sec.
VOLUME TEST	Volume Knob	Display shows volume value for 2 seconds. Volume increases or decreases in steps of 1 until 0 (Min.) or 40 (Max.) is reached.
LEAVE SERVICE TESTPROGRAM	Disconnect mains cord	

Error code	Type	Error Description
E1000	W	Focus Error Triggered when the focus could not be found within a certain time when starting up the CD or when the focus is lost for a certain time during play.
E1001	W	Radial Error Triggered when the radial servo is off-track for a certain time during play.
E1002	W	Sledge In Error The sledge did not reach its inner position (inner-switch is still close) before approximately 6 Sec. have passed. Inner-switch or sledge motor problem.
E1003	W	Sledge Out Error The sledge did not come out of its inner position (inner-switch is still open) before approximately 250 mSec. have passed by. Inner-switch or sledge motor problem.
E1005	W	Jump-offtrack error Triggered in normal play when the jump destination could not be found within a certain time.
E1006	W	Subcode Error (no subcode within time) Triggered when a new subcode was missing for a certain time during play.
E1007	W	PLL Error The Phase Lock Loop could not lock within a certain time.
E1008	W	Turntable Motor Error Generated when the CD could not reached 75% of speed during startup within a certain time. Discmotor problem.
E1020	F	Focus Search Error The focus point has not been found within a certain time.
E1070	W	The carousel switch is not open within certain time. This can happen when either the switch is defective and closed all the time, or when the carousel is blocked when located exactly at a disc position.
E1071	W	The carousel position switch did not close within a certain time. This can happen when the switch is defective and never closes electrically, or when the carousel is blocked in between two disc positions. The time-out is approximately 5 Sec.
E1079	W	The drawer could not enter the inside position is opening again. This can be caused because the drawer is blocked by something and cannot go fully inside, or the drawer switch is defective and does not close.
E2020*	F	Head Movement Error Deck 1 Generated if the head does not reach the desired position within a certain time.
E2021*	F	Head Movement Error Deck 2 Generated if the head does not reach the desired position within a certain time.

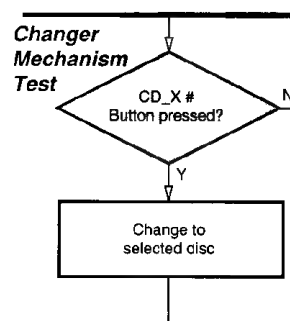
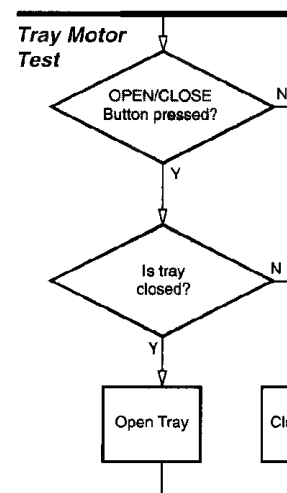
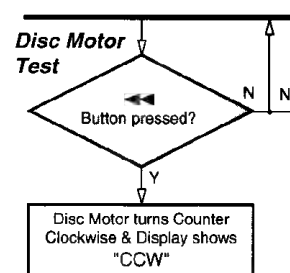
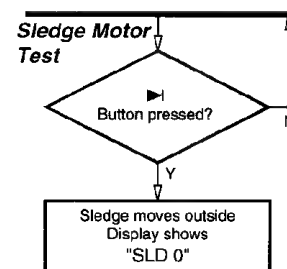
F – Fatal error & the set stop play function      W = Warning  
\* For Logic set only.

Table 2

Keys activated	Display shows	Keys activated	Display shows	Keys activated	Display shows
No Key pressed	--	CLOCK /TIMER	10	RECORD *	21
Any Remote control key	RC	PROGRAM	11	REPLAY *	22
CD1 *	1	INCR. SURROUND *	12	◀◀	23
CD2 *	2	VOLUME UP *	13	▶▶	24
CD3 *	3	VOLUME DOWN *	14	■	Exit
DISC CHANGE	4	STANDBY - ON	15	▶	26
OPEN / CLOSE	5	CD	16	◀	27
DSC	6	TUNER	17	▶	28
DBB	7	TAPE	18		
RDS *	8	AUX	19		
NEWS *	9	DUBBING	20		

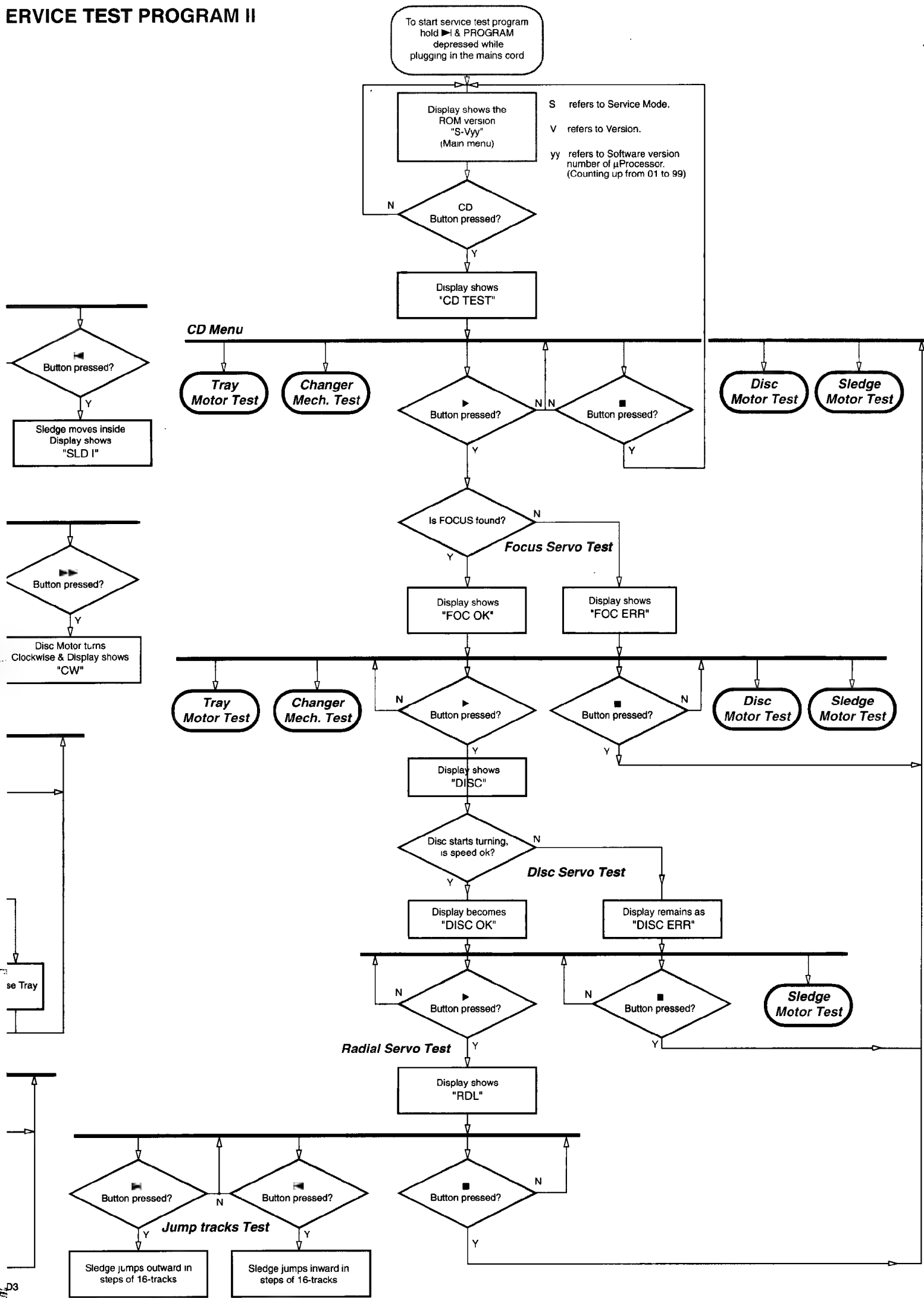
\* Not for all type/version

Table 3



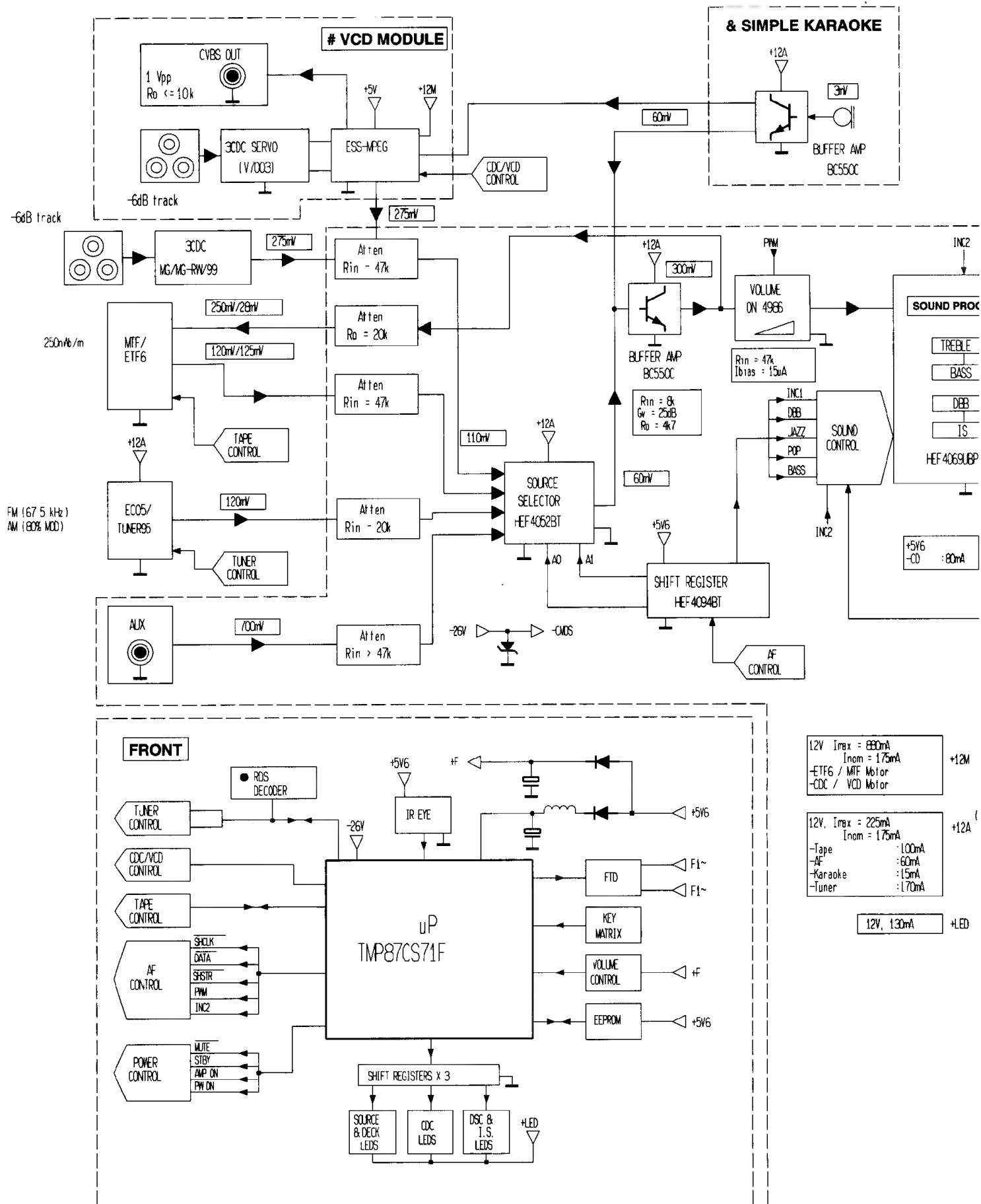
# CD\_X refers to CD1, CD2 or C

## SERVICE TEST PROGRAM II





## SET BLOCK DIAGRAM



## LEGEND:

mV AC SIGNAL LEVEL

→ SIGNAL FLOW

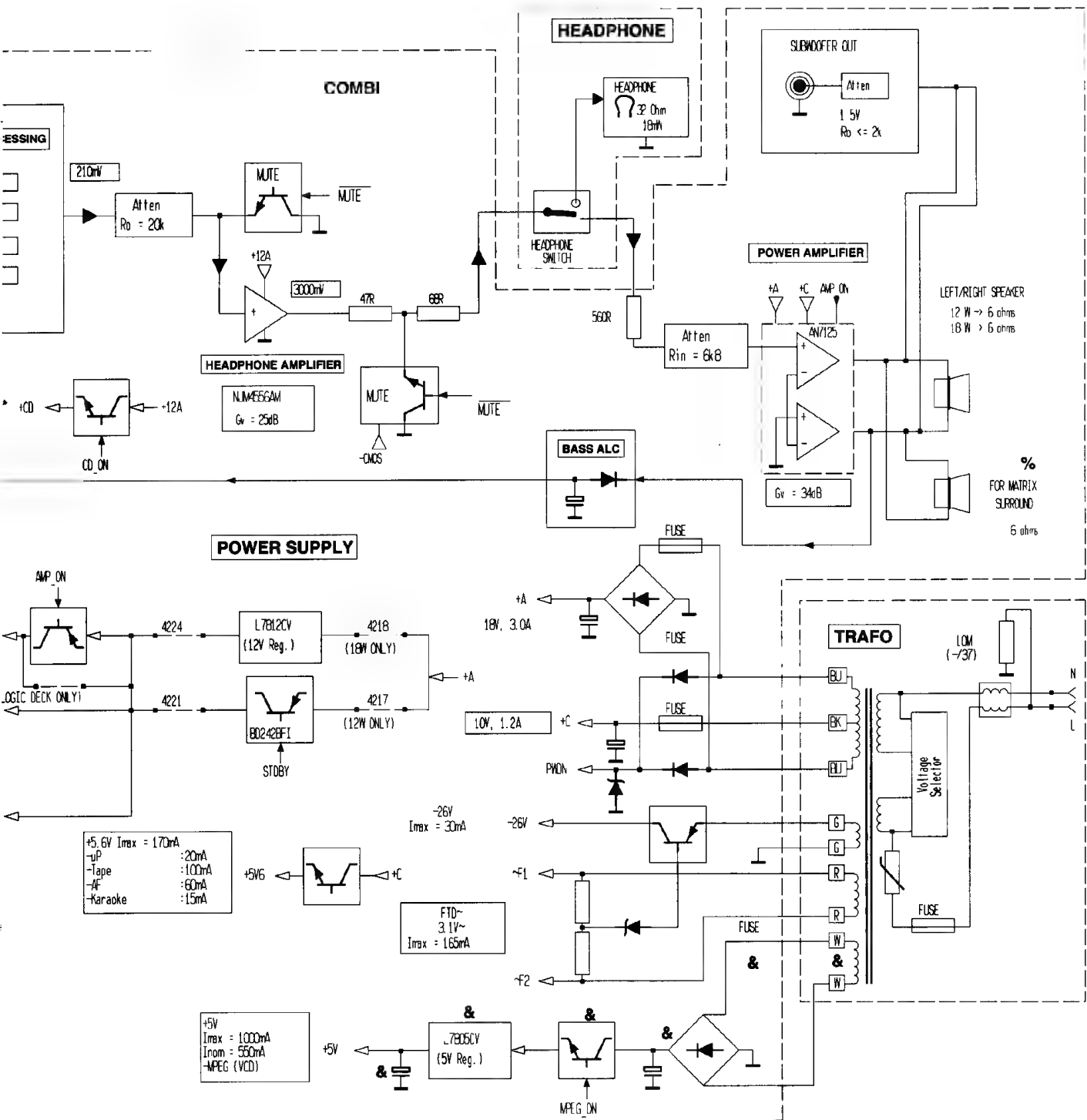
→ CONTROL SIGNAL

ALL OUTPUTS FROM SOURCES ARE  
1kHz, 0dB UNLESS STATED OTHERWISE

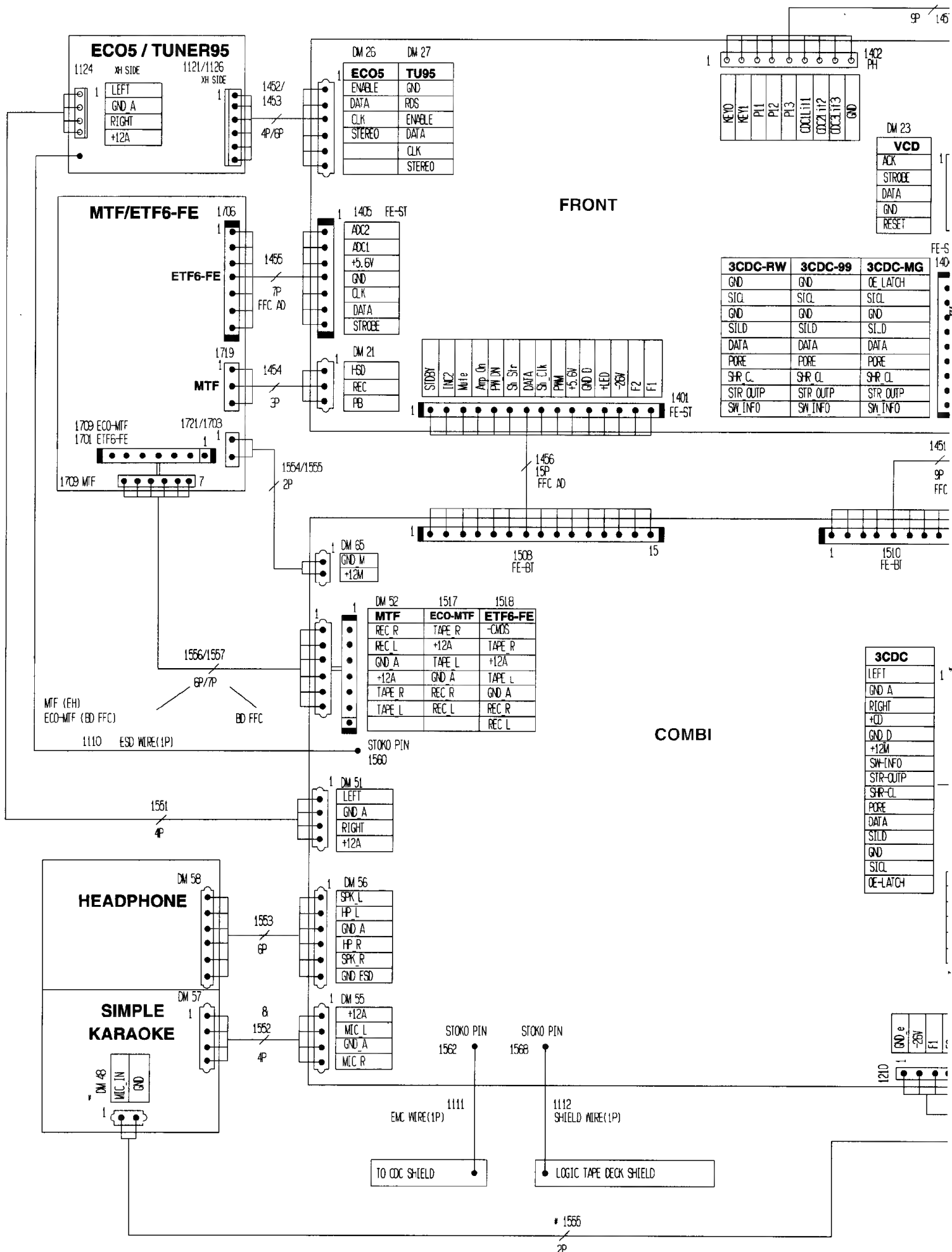
% MATRIX SURR. FEATURE ONLY FOR FV68EC, FV68EC, FV65C

\* VCD FEATURE ONLY FOR FV68BV/21

& SIMPLE KARAOKE FEATURE FOR -21 VER.



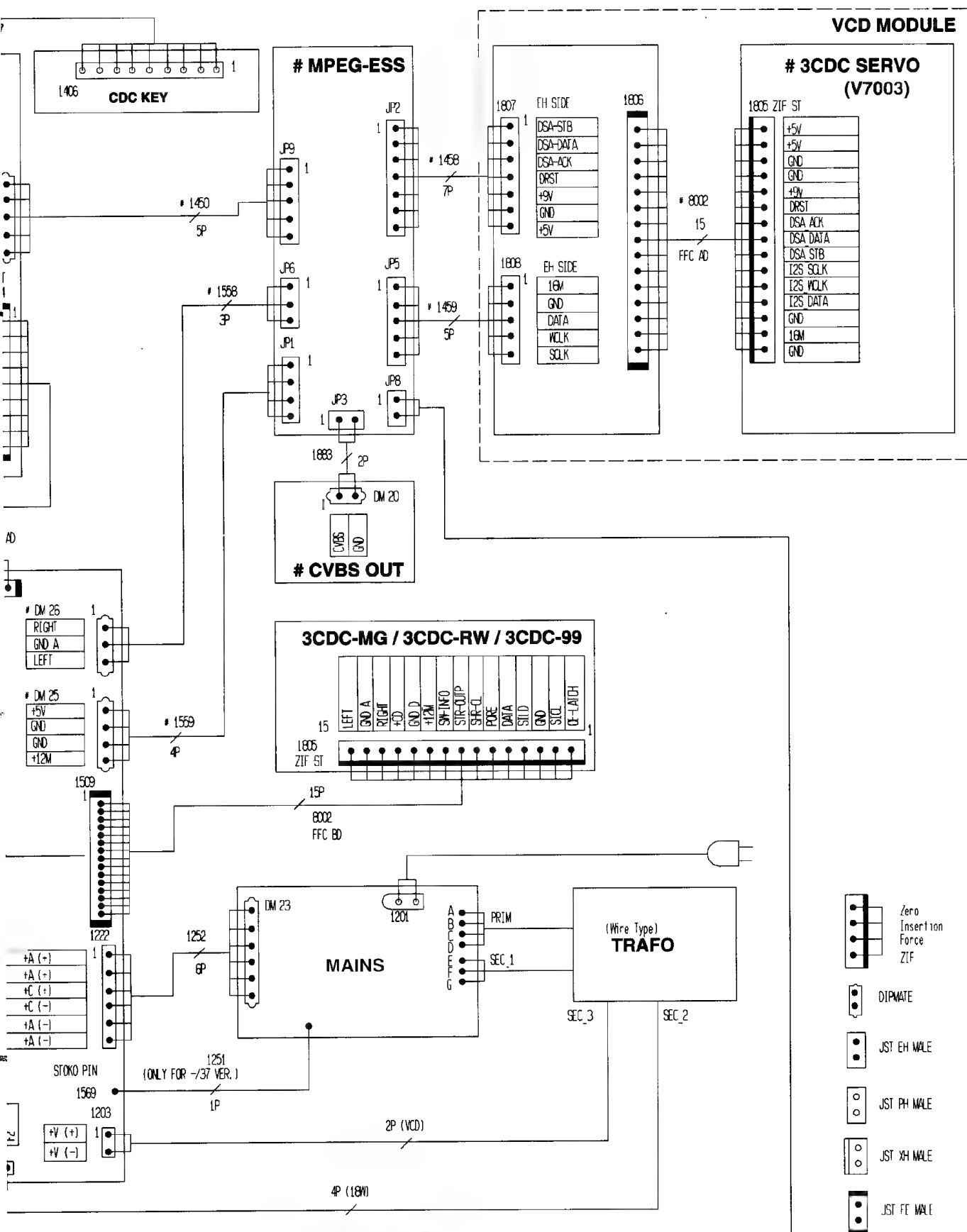
## SET WIRING DIAGRAM



# : VCD VERSION FOR FW390V/21

UPDATED : 23/10/98

& : FOR VERSIONS WITH SIMPLE KARAOKE



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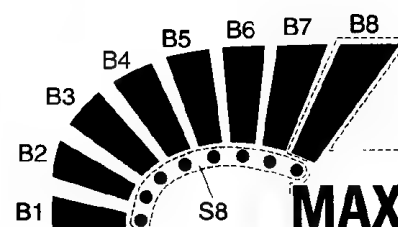
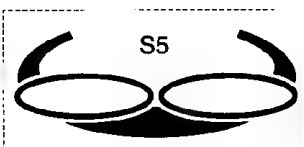
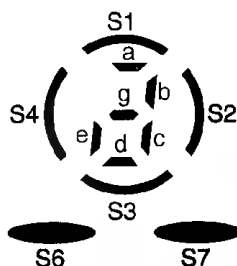
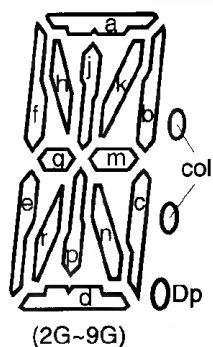
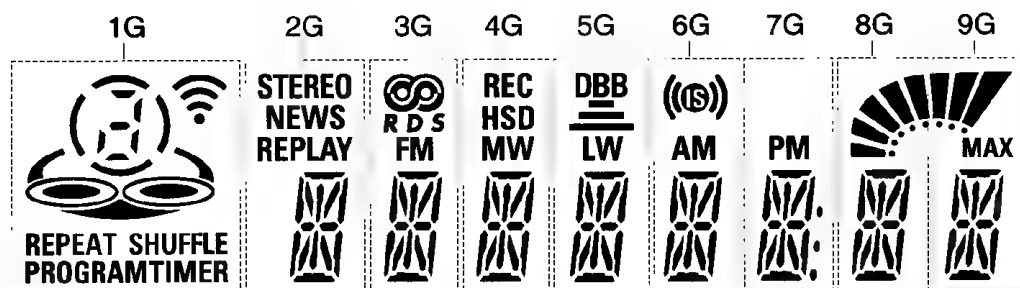
# FRONT BOARD

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## TABLE OF CONTENTS

LCD pin connection & Variation table .....	6-1
Main part - Component & Chip layout .....	6-2
Optical part - Circuit & Layouts .....	6-2
Main part - Circuit diagram .....	6-3
Electrical parts list .....	6-4

## LCD DISPLAY PIN CONNECTIONS

[illegible]

## Front Board application

A51200	FW45C/37, FW320C/21/21M/22/37
A51220	FW55C/37
A51240	FW350C/22/34
A51350	FW380C/21/21M
A51360	FW390C/37, FW398C/30

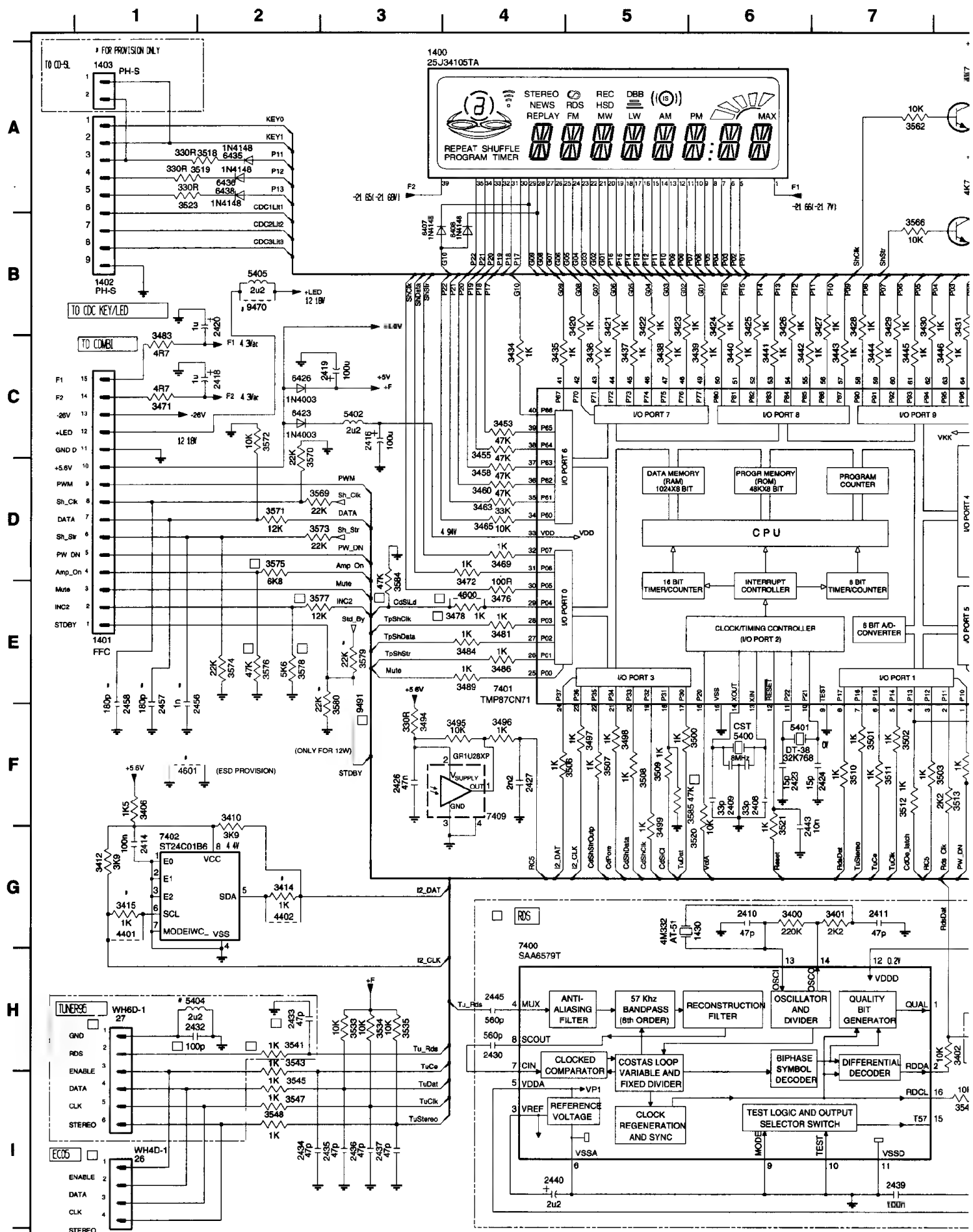
A51370	FW390C/21/21M, FW398C/21/21M
A51380	FW390C/22/34, FW398C/34
A51390	FW390V/21/21M
A51400	FW65C/37, FW380C/30/37, FW386C/37

## Variations table for Front Board

ITEM NO.	A51200	A51220	A51240	A51350	A51360	A51370	A51380	A51390	A51400	
DM21	x	x	-	x	-	-	-	-	x	
DM23	-	-	-	-	-	-	-	x	-	
DM26	x	x	-	x	x	x	-	x	x	
DM27	-	-	x	-	x	x	x	x	-	
1404	x	x	x	x	x	x	x	-		
1405	-	-	x	-	x	x	x	x	-	
1408	-	-	x	-	x	x	x	x	-	
1409	-	-	x	-	x	x	x	x	-	
1418	-	-	x	-	-	-	x	x	-	
1419	-	-	x	-	-	-	x	x	-	
1423	-	-	-	-	x	x	x	x	-	
1424	x	-	-	-	-	-	-	-	-	
1425	x	-	-	-	-	-	-	-	-	
2417	-	220μF	220μF	220μF	220μF	220μF	220μF	220μF	220μF	
2421	2,2μF	22μF	22μF	22μF	22μF	22μF	22μF	22μF	22μF	
2431	-	100nF	100nF	100nF	100nF	100nF	100nF	100nF	100nF	
2432	-	-	100pF	-	-	-	100pF	-	-	
2433	-	-	47pF	-	-	-	47pF	-	-	
3407	-	-	-	-	1k	1k	1k	1k	-	
3478	1k	1k	1k	1k	1k	1k	1k	-	1k	
3479	100R	100R	100R	100R	100R	100R	100R	-	100R	
3509	1k	1k	1k	1k	1k	1k	1k	-	1k	
3539	10k	10k	-	10k	10k	10k	-	10k	10k	
3541	-	-	1k	-	-	-	1k	-	-	
3546	10k	10k	-	10k	10k	10k	-	10k	10k	
3575	6k8	10k	10k	10k	10k	10k	10k	10k	10k	
3576	47k	10k	10k	10k	10k	10k	10k	10k	10k	
3577	-	-	-	-	12k	12k	12k	12k	12k	
3578	-	-	-	-	5k6	5k6	5k6	5k6	5k6	
3584	-	-	-	-	-	-	-	47k	-	
3585	-	-	-	-	-	-	-	47k	-	
3586	-	-	47k	-	47k	-	47k	47k	-	
3587	-	-	-	-	-	-	-	47k	-	
4400	x	x	-	x	-	-	-	-	x	
4403	x	-	-	-	-	-	-	-	-	
4501	x	x	x	-	-	-	-	-	-	
4540	-	x	x	x	x	x	x	x	x	
4600	-	-	-	-	-	-	-	x	-	
4602	x	-	-	-	-	-	-	-	-	
4603	-	x	x	x	x	x	x	x	x	
5403	-	-	2,2μH	-	-	-	2,2μH	-	-	
6402	-	-	-	-	x	x	x	x	-	
6419	x	x	x	x	-	-	-	-	-	
6421	x	-	-	-	-	-	-	-	-	
6424	-	-	-	x	-	x	-	x	-	
6427	x	x	x	-	-	-	-	-	-	
9491	-	x	x	-	-	-	-	-	-	
FEATURE:										
RDS	-	-	x	-	-	-	x	-	-	
CTRL LIT.	-	-	-	x	x	x	x	x	x	
Rotary Encoder	-	x	x	x	x	x	x	x	x	
Digital Out	-	-	-	-	-	-	-	-	-	

x = Item in use.

## CIRCUIT DIAGRAM

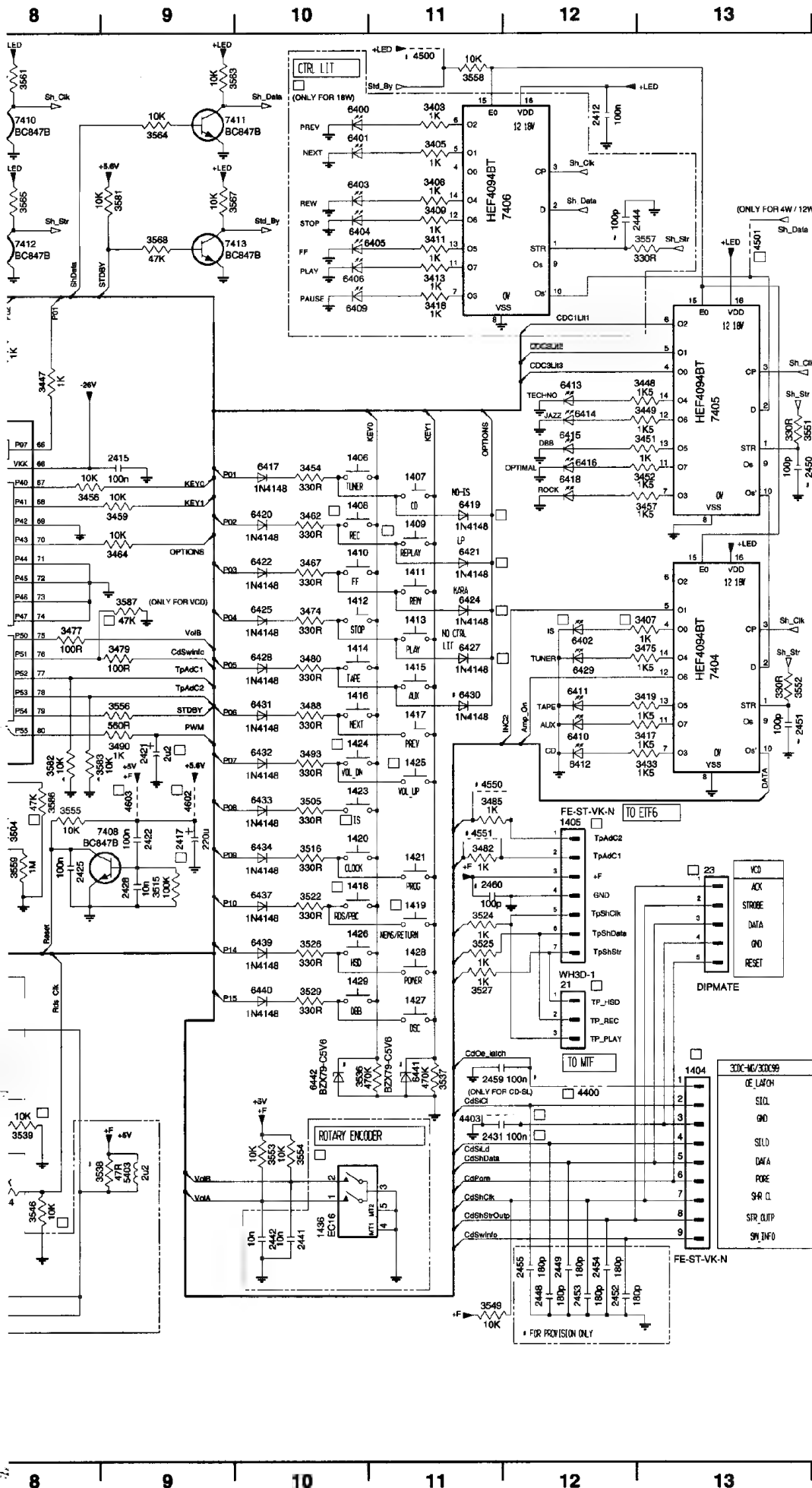


D.C. VOLTAGES DURING ACTIVE PLAY  
VALUES IN BRACKET ARE D.C. VOLTAGES AT STANDBY.

## LEGEND :

- REFER TO VARIANTS TABLE
- \* FOR PROVISION ONLY
- \* FOR MTF ONLY





21 G12	3424 B6	3547 I2	7406 A11
23 F13	3425 B6	3548 I2	7408 F9
26 H1	3426 B6	3549 I11	7409 F4
27 H1	3427 B7	3551 C13	7410 A8
1400 A3	3428 B7	3553 E13	7411 A9
1401 E1	3429 B7	3553 H10	7412 B8
1402 B1	3430 B7	3554 H10	7413 B8
1403 A1	3431 B8	3555 F8	9470 B2
1404 H13	3433 F13	3556 E9	9471 F3
1405 F12	3434 C4	3557 B13	
1406 C10	3435 C4	3558 A11	
1407 C11	3436 C5	3558 F8	
1408 D10	3437 C5	3561 A8	
1409 D11	3438 C5	3562 A7	
1410 D10	3439 C6	3563 A9	
1411 D11	3440 C6	3564 A9	
1412 D10	3441 C6	3565 A8	
1413 D11	3442 C6	3566 B7	
1414 E10	3443 C7	3567 A8	
1415 E11	3444 C7	3568 B9	
1416 E10	3445 C7	3569 D2	
1417 E11	3446 C8	3570 D2	
1418 F10	3447 C8	3571 D2	
1419 G11	3448 C13	3572 C2	
1420 F10	3449 C13	3573 D2	
1421 F11	3451 C13	3574 E2	
1423 F10	3452 C13	3575 D2	
1424 E10	3453 C4	3576 E2	
1425 F11	3454 C10	3577 E2	
1426 G10	3455 D4	3578 E3	
1427 G11	3456 C8	3579 E3	
1428 G11	3457 D13	3580 F3	
1429 G10	3458 D4	3581 A9	
1430 G8	3459 D8	3582 F8	
1436 I10	3460 D4	3583 F8	
2408 F6	3462 D10	3584 E3	
2409 F6	3463 D4	3585 F6	
2410 G6	3464 D9	3586 F8	
2411 G7	3465 D4	3587 D8	
2412 A12	3467 D10	4400 H12	
2414 G1	3468 D4	4401 G1	
2415 C8	3471 C1	4402 G2	
2416 C3	3472 D4	4403 H11	
2417 F9	3474 D10	4500 A11	
2418 C2	3475 E13	4501 B13	
2419 C3	3476 E4	4550 F11	
2420 B2	3477 E8	4551 F11	
2421 E9	3478 E4	4600 E8	
2422 F8	3479 E9	4601 F1	
2423 F8	3480 E10	4602 F9	
2424 F7	3481 E4	4603 F9	
2425 F8	3482 F11	4600 F6	
2426 F3	3483 C1	5401 F6	
2427 F4	3484 E4	5402 C3	
2428 F9	3485 F11	5403 H1	
3430 H4	3486 E4	5404 H1	
2431 H11	3488 E10	5405 B2	
2432 H1	3489 E4	6400 A10	
2433 H2	3490 E9	6401 A10	
2434 I2	3493 E10	6402 E12	
2435 I3	3494 F3	6403 A10	
2436 I3	3495 F4	6404 B10	
2437 I3	3496 F4	6405 B11	
2439 I7	3497 F5	6406 B10	
2440 I4	3498 F5	5407 B3	
2441 I10	3499 G5	5408 B4	
2442 I10	3500 F8	6408 B10	
2443 G6	3501 F7	6410 E12	
2444 A12	3502 F7	6411 E12	
2445 H4	3503 F8	6412 F12	
2448 I12	3504 F8	6413 C12	
2449 I12	3505 F10	6414 C12	
2450 C13	3506 F5	6415 C12	
2451 E13	3507 F5	6416 C12	
2452 I12	3508 F5	6417 C10	
2453 I12	3509 F5	6418 C12	
2454 I12	3510 F7	6419 D11	
2455 I12	3511 F7	6420 D10	
2456 F1	3512 F7	6421 D11	
2457 F1	3513 F8	6422 D10	
2458 F1	3515 F9	6423 C2	
2459 H11	3516 F10	6424 D11	
2460 F11	3518 A2	6425 D10	
3400 G8	3519 A2	6426 C2	
3401 G7	3520 G6	6427 E11	
3402 H8	3521 F6	6428 E10	
3403 A11	3522 G10	6429 E12	
3405 A11	3523 A1	6430 E11	
3406 F1	3524 G11	6431 E10	
3407 D13	3525 G11	6432 E10	
3408 A11	3526 G10	6433 F10	
3409 A11	3527 G11	6434 F10	
3410 F2	3529 G10	6435 A2	
3411 B11	3533 H3	6436 A2	
3412 G1	3534 H3	6437 G10	
3413 B11	3535 H3	6438 A2	
3414 G2	3536 H10	6439 G10	
3415 G1	3537 H11	6440 G10	
3416 B11	3538 I9	6441 H11	
3417 E13	3539 H8	6442 H10	
3419 E13	3541 H2	7400 H4	
3420 B5	3543 H2	7401 E4	
3421 B5	3544 I8	7402 G1	
3422 B5	3545 I2	7404 E13	
3423 B5	3546 I8	7405 C13	

**ELECTRICAL PARTS LIST - FRONT BOARD****MISCELLANEOUS**

1400	4822 135 00171	FTD Display
1401	4822 265 10979	Flex Socket 15pin Hort.
1404	4822 265 11531	Flex Socket 9pin Hort.
1405	4822 267 10956	Flex Socket 7pin Hort.
1406	4822 276 13775	Tact Switch
1407	4822 276 13775	Tact Switch
1408	4822 276 13775	Tact Switch
1409	4822 276 13775	Tact Switch
1410	4822 276 13775	Tact Switch
1411	4822 276 13775	Tact Switch
1412	4822 276 13775	Tact Switch
1413	4822 276 13775	Tact Switch
1414	4822 276 13775	Tact Switch
1415	4822 276 13775	Tact Switch
1416	4822 276 13775	Tact Switch
1417	4822 276 13775	Tact Switch
1418	4822 276 13775	Tact Switch
1419	4822 276 13775	Tact Switch
1420	4822 276 13775	Tact Switch
1421	4822 276 13775	Tact Switch
1423	4822 276 13775	Tact Switch
1426	4822 276 13775	Tact Switch
1427	4822 276 13775	Tact Switch
1428	4822 276 13775	Tact Switch
1429	4822 276 13775	Tact Switch
1430	4822 242 72195	Quartz 4,332MHz
1436	4822 273 10365	Rotary Encoder 24P

**CAPACITORS**

2408	5322 122 32659	33pF 5% 50V
2409	5322 122 32659	33pF 5% 50V
2410	4822 126 13692	47pF 1% 63V
2411	4822 126 13692	47pF 1% 63V
2412	4822 126 14118	100nF +80/-20% 50V
2414	4822 126 14118	100nF +80/-20% 50V
2415	4822 126 14118	100nF +80/-20% 50V
2416	4822 124 23432	100µF 20% 10V
2417	4822 124 12245	220µF 20% 10V
2418	4822 124 40242	1µF 20% 63V
2419	4822 124 41584	100µF 20% 10V
2420	4822 124 22651	1µF 20% 50V
2421	4822 124 41796	22µF 20% 16V
2422	4822 126 14118	100nF +80/-20% 50V
2423	4822 126 13486	15pF 2% 63V
2424	4822 126 13486	15pF 2% 63V
2425	4822 126 14118	100nF +80/-20% 50V
2426	4822 126 13751	47nF 10% 63V
2427	4822 122 33175	2,2nF 20% 50V
2428	4822 122 33177	10nF 20% 50V
2430	5322 116 80853	560pF 5% 63V
2431	4822 126 14087	100nF 10% 63V
2432	5322 122 32531	100pF 5% 50V

2433	4822 126 13692	47pF 1% 63V
2434	4822 126 13692	47pF 1% 63V
2435	4822 126 13692	47pF 1% 63V
2436	4822 126 13692	47pF 1% 63V
2437	4822 126 13692	47pF 1% 63V
2439	4822 126 13196	100nF 10% 25V
2440	4822 124 22652	2,2µF 20% 50V
2441	4822 122 33177	10nF 20% 50V
2442	4822 122 33177	10nF 20% 50V
2443	4822 122 33177	10nF 20% 50V
2445	5322 116 80853	560pF 5% 63V

**RESISTORS**

3400	4822 117 13579	220k 1% 0.1W
3401	4822 117 11449	2k2 1% 0,1W
3402	4822 117 10833	10k 1% 0,1W
3403	4822 051 10102	1k 2% 0,25W
3405	4822 051 10102	1k 2% 0,25W
3406	4822 117 11139	1k5 1% 0,1W
3407	4822 050 11002	1k 1% 0,4W
3408	4822 051 10102	1k 2% 0,25W
3409	4822 051 10102	1k 2% 0,25W
3410	4822 051 20392	3k9 5% 0,1W
3411	4822 051 10102	1k 2% 0,25W
3412	4822 051 20392	3k9 5% 0,1W
3413	4822 051 10102	1k 2% 0,25W
3416	4822 051 10102	1k 2% 0,25W
3417	4822 117 11139	1k5 1% 0,1W
3419	4822 117 11139	1k5 1% 0,1W
3420	4822 051 10102	1k 2% 0,25W
3421	4822 051 10102	1k 2% 0,25W
3422	4822 051 10102	1k 2% 0,25W
3423	4822 051 10102	1k 2% 0,25W
3424	4822 051 10102	1k 2% 0,25W
3425	4822 051 10102	1k 2% 0,25W
3426	4822 051 10102	1k 2% 0,25W
3427	4822 051 10102	1k 2% 0,25W
3428	4822 051 10102	1k 2% 0,25W
3429	4822 051 10102	1k 2% 0,25W
3430	4822 051 10102	1k 2% 0,25W
3431	4822 051 10102	1k 2% 0,25W
3433	4822 117 11139	1k5 1% 0,1W
3434	4822 051 10102	1k 2% 0,25W
3435	4822 051 10102	1k 2% 0,25W
3436	4822 051 10102	1k 2% 0,25W
3437	4822 051 10102	1k 2% 0,25W
3438	4822 051 10102	1k 2% 0,25W
3439	4822 051 10102	1k 2% 0,25W
3440	4822 051 10102	1k 2% 0,25W
3441	4822 051 10102	1k 2% 0,25W
3442	4822 051 10102	1k 2% 0,25W
3443	4822 051 10102	1k 2% 0,25W

**ELECTRICAL PARTS LIST - FRONT BOARD**

3444	4822 051 10102	1k 2% 0,25W	3505	4822 051 20331	330R 5% 0,1W
3445	4822 051 10102	1k 2% 0,25W	3506	4822 050 11002	1k 1% 0,4W
3446	4822 051 10102	1k 2% 0,25W	3507	4822 051 10102	1k 2% 0,25W
3447	4822 051 10102	1k 2% 0,25W	3508	4822 051 10102	1k 2% 0,25W
3448	4822 117 11139	1k5 1% 0,1W	3509	4822 051 10102	1k 2% 0,25W
3449	4822 117 11139	1k5 1% 0,1W	3510	4822 051 10102	1k 2% 0,25W
3451	4822 051 10102	1k 2% 0,25W	3511	4822 051 10102	1k 2% 0,25W
3452	4822 117 11139	1k5 1% 0,1W	3512	4822 051 10102	1k 2% 0,25W
3453	4822 116 83884	47k 5% 0,5W	3513	4822 117 11449	2k2 1% 0,1W
3454	4822 051 20331	330R 5% 0,1W	3515	4822 051 20104	100k 5% 0,1W
3455	4822 116 83884	47k 5% 0,5W	3516	4822 051 20331	330R 5% 0,1W
3456	4822 117 10833	10k 1% 0,1W	3518	4822 051 20331	330R 5% 0,1W
3457	4822 117 11139	1k5 1% 0,1W	3519	4822 051 20331	330R 5% 0,1W
3458	4822 116 83884	47k 5% 0,5W	3520	4822 117 10833	10k 1% 0,1W
3459	4822 117 10833	10k 1% 0,1W	3521	4822 051 10102	1k 2% 0,25W
3460	4822 116 83884	47k 5% 0,5W	3522	4822 051 20331	330R 5% 0,1W
3462	4822 051 20331	330R 5% 0,1W	3523	4822 051 20331	330R 5% 0,1W
3463	4822 116 52271	33k 5% 0,5W	3524	4822 051 10102	1k 2% 0,25W
3464	4822 117 10833	10k 1% 0,1W	3525	4822 051 10102	1k 2% 0,25W
3465	4822 116 83864	10k 5% 0,5W	3526	4822 051 20331	330R 5% 0,1W
3467	4822 051 20331	330R 5% 0,1W	3527	4822 051 10102	1k 2% 0,25W
3469	4822 051 10102	1k 2% 0,25W	3529	4822 051 20331	330R 5% 0,1W
3471	4822 050 24708	4R7 1% 0,6W	3533	4822 117 10833	10k 1% 0,1W
3472	4822 051 10102	1k 2% 0,25W	3534	4822 117 10833	10k 1% 0,1W
3474	4822 051 20331	330R 5% 0,1W	3535	4822 117 10833	10k 1% 0,1W
3475	4822 116 52243	1k5 5% 0,5W	3536	4822 051 20474	470k 5% 0,1W
3476	4822 051 20101	100R 5% 0,1W	3537	4822 051 20474	470k 5% 0,1W
3477	4822 051 20101	100R 5% 0,1W	3539	4822 117 10833	10k 1% 0,1W
3478	4822 051 10102	1k 2% 0,25W	3541	4822 051 10102	1k 2% 0,25W
3479	4822 051 20101	100R 5% 0,1W	3543	4822 051 10102	1k 2% 0,25W
3480	4822 051 20331	330R 5% 0,1W	3544	4822 117 10833	10k 1% 0,1W
3481	4822 051 10102	1k 2% 0,25W	3545	4822 051 10102	1k 2% 0,25W
3482	4822 051 10102	1k 2% 0,25W	3546	4822 117 10833	10k 1% 0,1W
3483	4822 050 24708	4R7 1% 0,6W	3547	4822 051 10102	1k 2% 0,25W
3484	4822 051 10102	1k 2% 0,25W	3548	4822 051 10102	1k 2% 0,25W
3485	4822 051 10102	1k 2% 0,25W	3549	4822 116 83864	10k 5% 0,5W
3486	4822 051 10102	1k 2% 0,25W	3551	4822 051 20331	330R 5% 0,1W
3488	4822 051 20331	330R 5% 0,1W	3552	4822 051 20331	330R 5% 0,1W
3489	4822 051 10102	1k 2% 0,25W	3553	4822 117 10833	10k 1% 0,1W
3490	4822 051 10102	1k 2% 0,25W	3554	4822 117 10833	10k 1% 0,1W
3493	4822 051 20331	330R 5% 0,1W	3555	4822 117 10833	10k 1% 0,1W
3494	4822 051 20331	330R 5% 0,1W	3556	4822 051 20561	560R 5% 0,1W
3495	4822 117 10833	10k 1% 0,1W	3557	4822 051 20331	330R 5% 0,1W
3496	4822 051 10102	1k 2% 0,25W	3558	4822 117 10833	10k 1% 0,1W
3497	4822 050 11002	1k 1% 0,4W	3559	4822 051 20105	1M 5% 0,1W
3498	4822 051 10102	1k 2% 0,25W	3561	4822 051 20472	4k7 5% 0,1W
3499	4822 051 10102	1k 2% 0,25W	3562	4822 117 10833	10k 1% 0,1W
3500	4822 051 10102	1k 2% 0,25W	3563	4822 117 10833	10k 1% 0,1W
3501	4822 050 11002	1k 1% 0,4W	3564	4822 117 10833	10k 1% 0,1W
3502	4822 050 11002	1k 1% 0,4W	3565	4822 051 20472	4k7 5% 0,1W
3503	4822 051 10102	1k 2% 0,25W	3566	4822 117 10833	10k 1% 0,1W
3504	4822 051 10102	1k 2% 0,25W	3567	4822 117 10833	10k 1% 0,1W

**ELECTRICAL PARTS LIST - FRONT BOARD****RESISTORS**

3568	4822 117 10834	47k 1% 0,1W
3569	4822 051 20223	22k 5% 0,1W
3570	4822 051 20223	22k 5% 0,1W
3571	4822 116 52238	12k 5% 0,5W
3572	4822 117 10833	10k 1% 0,1W
3573	4822 051 20223	22k 5% 0,1W
3574	4822 051 20223	22k 5% 0,1W
3575	4822 116 83864	10k 5% 0,5W
3576	4822 117 10833	10k 1% 0,1W
3577	4822 117 11383	12k 1% 0,1W
3578	4822 051 20562	5k6 5% 0,1W
3581	4822 117 10833	10k 1% 0,1W
3586	4822 117 10834	47k 1% 0,1W
4401	4822 051 20008	0R Jumper 0805
4402	4822 051 20008	0R Jumper 0805
4407	4822 051 20008	0R Jumper 0805
4408	4822 051 20008	0R Jumper 0805
4409	4822 051 20008	0R Jumper 0805
4410	4822 051 20008	0R Jumper 0805
4411	4822 051 20008	0R Jumper 0805
4412	4822 051 20008	0R Jumper 0805
4413	4822 051 20008	0R Jumper 0805
4414	4822 051 20008	0R Jumper 0805
4415	4822 051 20008	0R Jumper 0805
4416	4822 051 20008	0R Jumper 0805
4417	4822 051 20008	0R Jumper 0805
4418	4822 051 20008	0R Jumper 0805
4419	4822 051 20008	0R Jumper 0805
4420	4822 051 20008	0R Jumper 0805
4421	4822 051 20008	0R Jumper 0805
4422	4822 051 20008	0R Jumper 0805
4423	4822 051 20008	0R Jumper 0805
4424	4822 051 20008	0R Jumper 0805
4425	4822 051 20008	0R Jumper 0805
4426	4822 051 20008	0R Jumper 0805
4427	4822 051 20008	0R Jumper 0805
4428	4822 051 20008	0R Jumper 0805
4429	4822 051 20008	0R Jumper 0805
4430	4822 051 20008	0R Jumper 0805
4431	4822 051 20008	0R Jumper 0805
4432	4822 051 20008	0R Jumper 0805
4433	4822 051 20008	0R Jumper 0805
4434	4822 051 20008	0R Jumper 0805
4435	4822 051 20008	0R Jumper 0805
4436	4822 051 20008	0R Jumper 0805
4437	4822 051 20008	0R Jumper 0805
4438	4822 051 20008	0R Jumper 0805
4439	4822 051 20008	0R Jumper 0805
4440	4822 051 20008	0R Jumper 0805
4441	4822 051 20008	0R Jumper 0805
4442	4822 051 20008	0R Jumper 0805
4443	4822 051 20008	0R Jumper 0805

4444	4822 051 20008	0R Jumper 0805
4445	4822 051 20008	0R Jumper 0805
4446	4822 051 20008	0R Jumper 0805
4447	4822 051 20008	0R Jumper 0805
4448	4822 051 20008	0R Jumper 0805
4449	4822 051 20008	0R Jumper 0805
4502	4822 051 20008	0R Jumper 0805
4503	4822 051 20008	0R Jumper 0805
4504	4822 051 20008	0R Jumper 0805
4505	4822 051 20008	0R Jumper 0805
4506	4822 051 20008	0R Jumper 0805
4507	4822 051 20008	0R Jumper 0805
4508	4822 051 20008	0R Jumper 0805
4509	4822 051 20008	0R Jumper 0805
4510	4822 051 20008	0R Jumper 0805
4511	4822 051 20008	0R Jumper 0805
4512	4822 051 20008	0R Jumper 0805
4513	4822 051 20008	0R Jumper 0805
4514	4822 051 20008	0R Jumper 0805
4515	4822 051 20008	0R Jumper 0805
4516	4822 051 20008	0R Jumper 0805
4517	4822 051 20008	0R Jumper 0805
4518	4822 051 20008	0R Jumper 0805
4519	4822 051 20008	0R Jumper 0805
4520	4822 051 20008	0R Jumper 0805
4521	4822 051 20008	0R Jumper 0805
4522	4822 051 20008	0R Jumper 0805
4525	4822 051 20008	0R Jumper 0805
4526	4822 051 20008	0R Jumper 0805
4527	4822 051 20008	0R Jumper 0805
4528	4822 051 20008	0R Jumper 0805
4529	4822 051 20008	0R Jumper 0805
4530	4822 051 20008	0R Jumper 0805
4531	4822 051 20008	0R Jumper 0805
4532	4822 051 20008	0R Jumper 0805
4533	4822 051 20008	0R Jumper 0805
4534	4822 051 20008	0R Jumper 0805
4535	4822 051 20008	0R Jumper 0805
4536	4822 051 20008	0R Jumper 0805
4537	4822 051 20008	0R Jumper 0805
4538	4822 051 20008	0R Jumper 0805
4539	4822 051 20008	0R Jumper 0805
4540	4822 051 20008	0R Jumper 0805
4602	4822 051 20008	0R Jumper 0805
4603	4822 051 20008	0R Jumper 0805

**COILS & FILTERS**

5400	4822 242 72066	Ceram Resonator 8MHz
5401	4822 242 70938	X'tal Resonator 32,768kHz
5402	4822 157 11477	Coil 2,2µH 5%
5403	4822 157 11477	Coil 2,2µH 5%
5405	4822 157 11477	Coil 2,2µH 5%

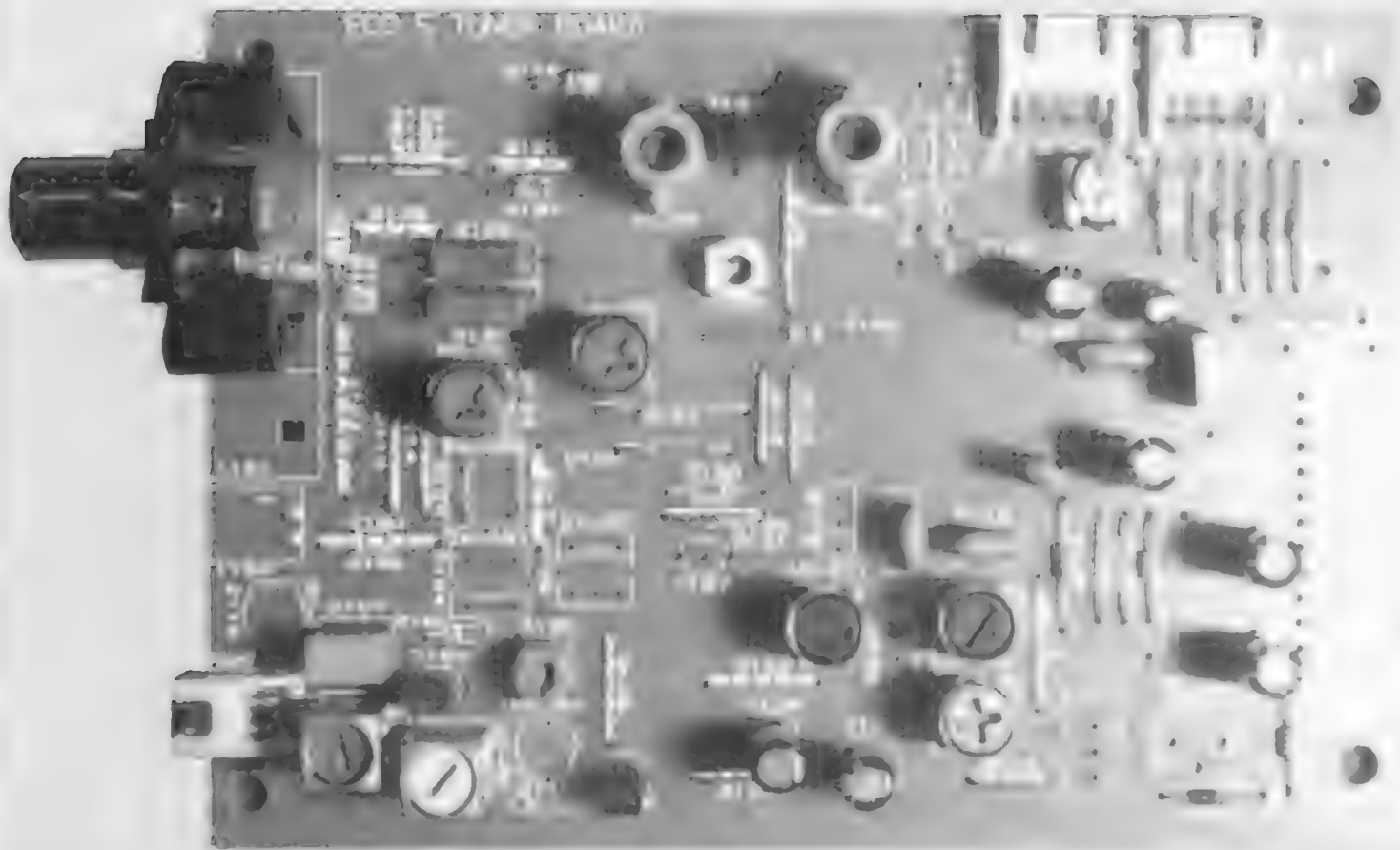
**ELECTRICAL PARTS LIST - FRONT BOARD****DIODES**

6400	4822 130 10791	LTL-1CHGE
6401	4822 130 10791	LTL-1CHGE
6402	4822 130 10791	LTL-1CHGE
6403	4822 130 10791	LTL-1CHGE
6404	4822 130 10791	LTL-1CHGE
6405	4822 130 10791	LTL-1CHGE
6406	4822 130 10791	LTL-1CHGE
6407	4822 130 30621	1N4148
6408	4822 130 30621	1N4148
6409	4822 130 10791	LTL-1CHGE
6410	4822 130 10792	LTL-1CHPE
6411	4822 130 10792	LTL-1CHPE
6412	4822 130 10792	LTL-1CHPE
6413	4822 130 10792	LTL-1CHPE
6414	4822 130 10792	LTL-1CHPE
6415	4822 130 10791	LTL-1CHGE
6416	4822 130 10792	LTL-1CHPE
6417	4822 130 30621	1N4148
6418	4822 130 10792	LTL-1CHPE
6420	4822 130 30621	1N4148
6422	4822 130 30621	1N4148
6423	4822 130 31878	1N4003G
6424	4822 130 30621	1N4148
6425	4822 130 30621	1N4148
6426	4822 130 31878	1N4003G
6428	4822 130 30621	1N4148
6429	4822 130 10792	LTL-1CHPE
6431	4822 130 30621	1N4148
6432	4822 130 30621	1N4148
6433	4822 130 30621	1N4148
6434	4822 130 30621	1N4148
6435	4822 130 30621	1N4148
6436	4822 130 30621	1N4148
6437	4822 130 30621	1N4148
6438	4822 130 30621	1N4148
6439	4822 130 30621	1N4148
6440	4822 130 30621	1N4148

**TRANSISTORS & INTEGRATED CIRCUITS**

7400	4822 209 31981	SAA6579T
7401	4822 209 17403	TMP87CS71F "350S51811"
7402	4822 209 31508	ST24C01B1
7404	5322 209 11306	HEF4094BT
7405	5322 209 11306	HEF4094BT
7406	5322 209 11306	HEF4094BT
7408	4822 130 60511	BC847B
7409	4822 130 10165	GP1U28XP
7410	4822 130 60511	BC847B
7411	4822 130 60511	BC847B
7412	4822 130 60511	BC847B
7413	4822 130 60511	BC847B

Note: Only the parts mentioned in this list are normal service parts.



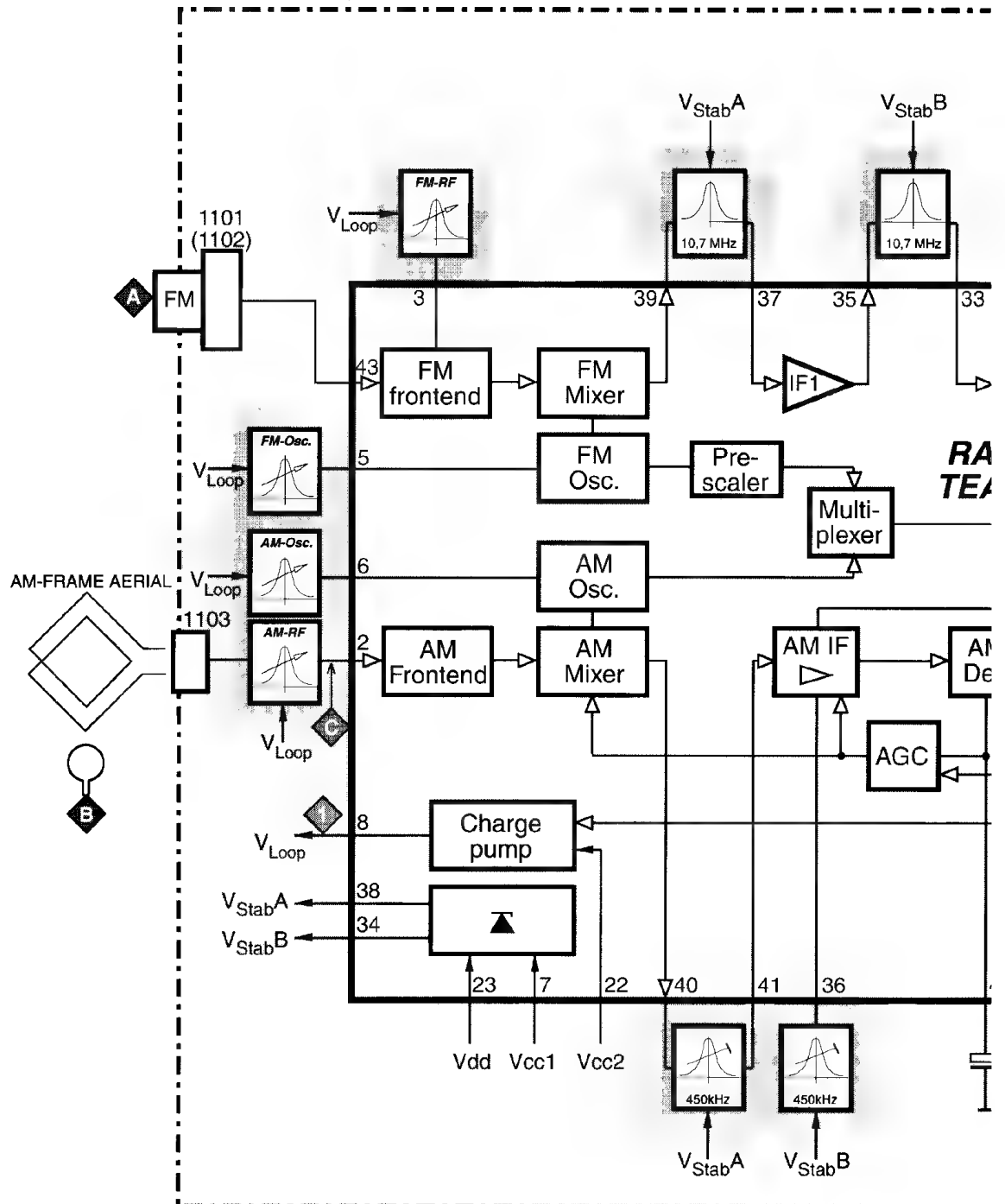
## ***TUNER BOARD ECO5***

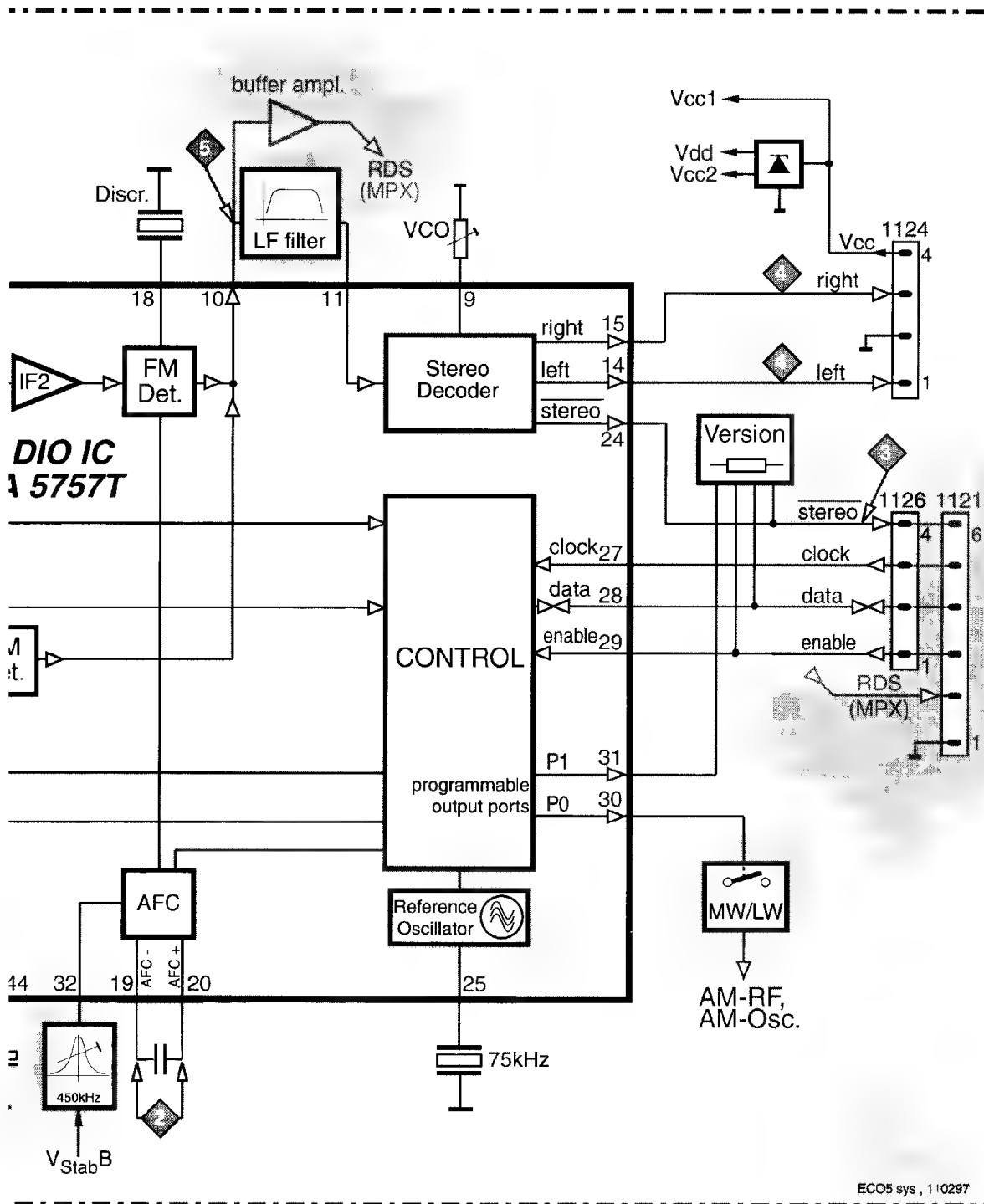
### **TABLE OF CONTENTS**

Block diagram .....	7B-1
Adjustment table .....	7B-2
Component layout .....	7B-2
Circuit diagram .....	7B-3
Parts list .....	7B-4

## BLOCKDIAGRAM

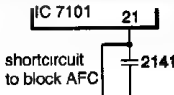
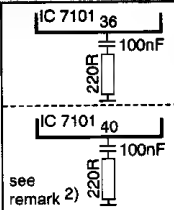
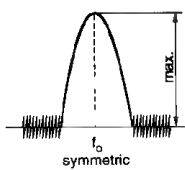

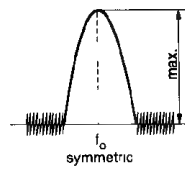
# **TUNER BOARD** **ECO 5 systems**







**TUNER ADJUSTMENT TABLE** ( ECO5 FM/MW- and FM/MW/LW - versions with AM-frame aerial )

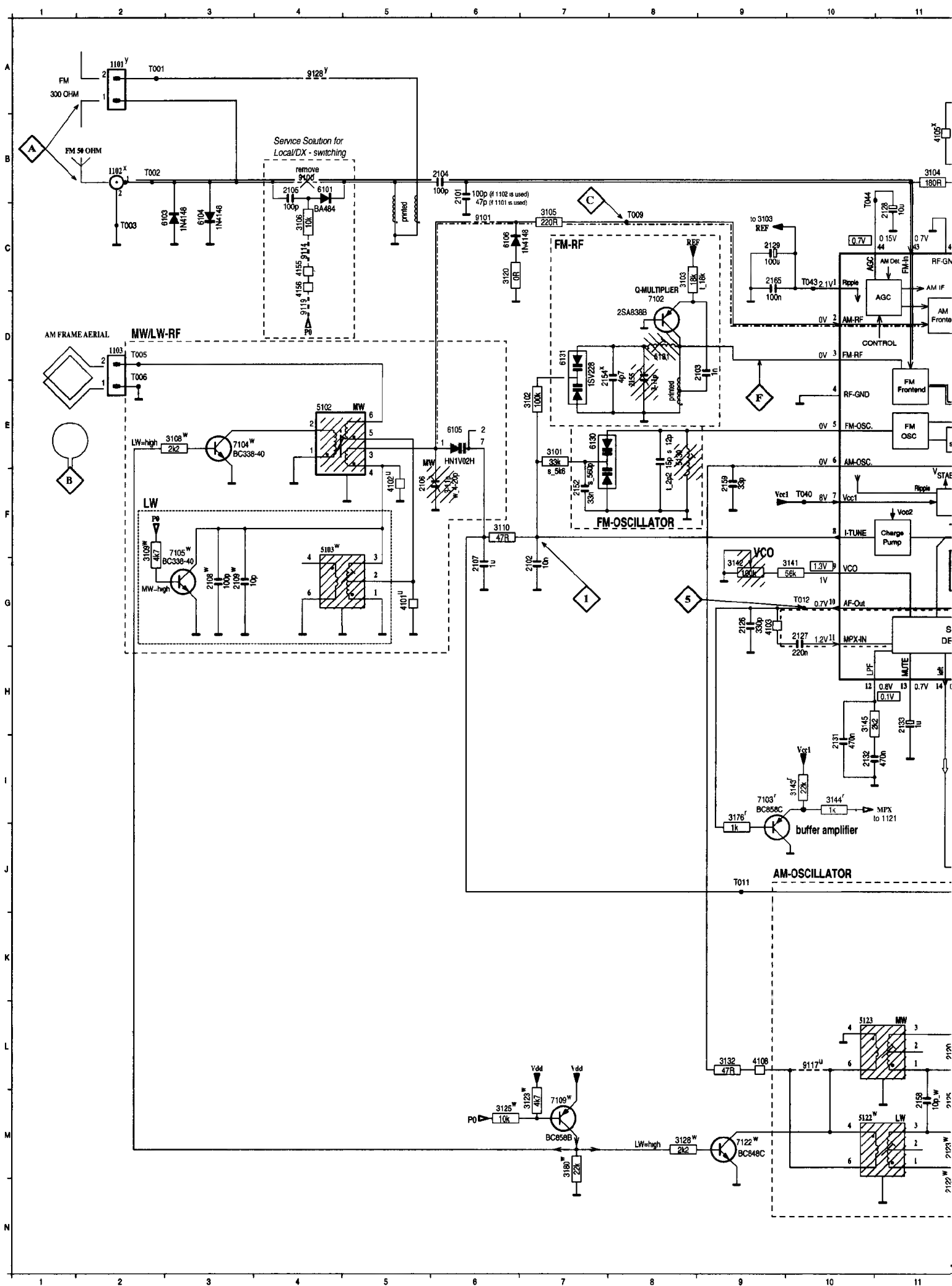
Waverange	Input frequency	Input	Tuned to	Adjust	Output	Scope/Voltmeter
VARICAP ALIGNMENT						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)			108MHz	5130	1	8V ±0.2V
			87.5MHz (65.81MHz)	check		4.3V ±0.5V (1.2V ±0.5V)
MW FM/AM-version, 10kHz grid 530 - 1700kHz			1700kHz	5123		8V ±0.2V
			530kHz	check		1.1V ±0.4V
FM/MW-version, 9kHz grid 531 - 1602kHz			1602kHz	5123		6.9V ±0.2V
			531kHz	check		1.1V ±0.4V
LW  153 - 279kHz			279kHz	5122		8V ±0.2V
			153kHz	check		1.1V ±0.4V
MW FM/MW/LW- version, 9kHz grid 531 - 1602kHz			1602kHz	5123		8V ±0.2V
			531kHz	check		1.1V ±0.4V
FM IF						
FM	10.7MHz, 50mV continuous wave	F		5119	2	0 ± 3 mV DC
FM RF						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)	108MHz	A  mod=1kHz Δf=±22.5kHz	108MHz	2155	4	MAX
	87.5MHz (65.81MHz)		87.5MHz (65.81MHz)	5131		
VCO						
FM	98MHz, 1mV continuous wave	A	98MHz	3142	3	152kHz ±1kHz <sup>1)</sup>
AM IF						
MW	450kHz  connect pin 6 of IC 7101 (AM Osc.) with short wire to ground (pin 4)	C  Δf=±15kHz V <sub>RF</sub> = 3mV	 see remark 2)	5111  5112	4	
AM AFC MW		C  continuous wave V <sub>RF</sub> = 10mV		5114		
AM RF <sup>3)</sup>						
MW <sup>4)</sup> FM/MW/LW- and FM/MW-version ( 9kHz grid) 531 - 1602kHz	1494kHz	B   Δf = ±30kHz V <sub>RF</sub> as low as possible	1494kHz	2106	4	
			558kHz	558kHz		
LW	198kHz		198kHz	5103		
MW FM/AM-version, 10kHz grid 530 - 1700kHz	1500kHz 560kHz		1500kHz 560kHz	2106 5102		

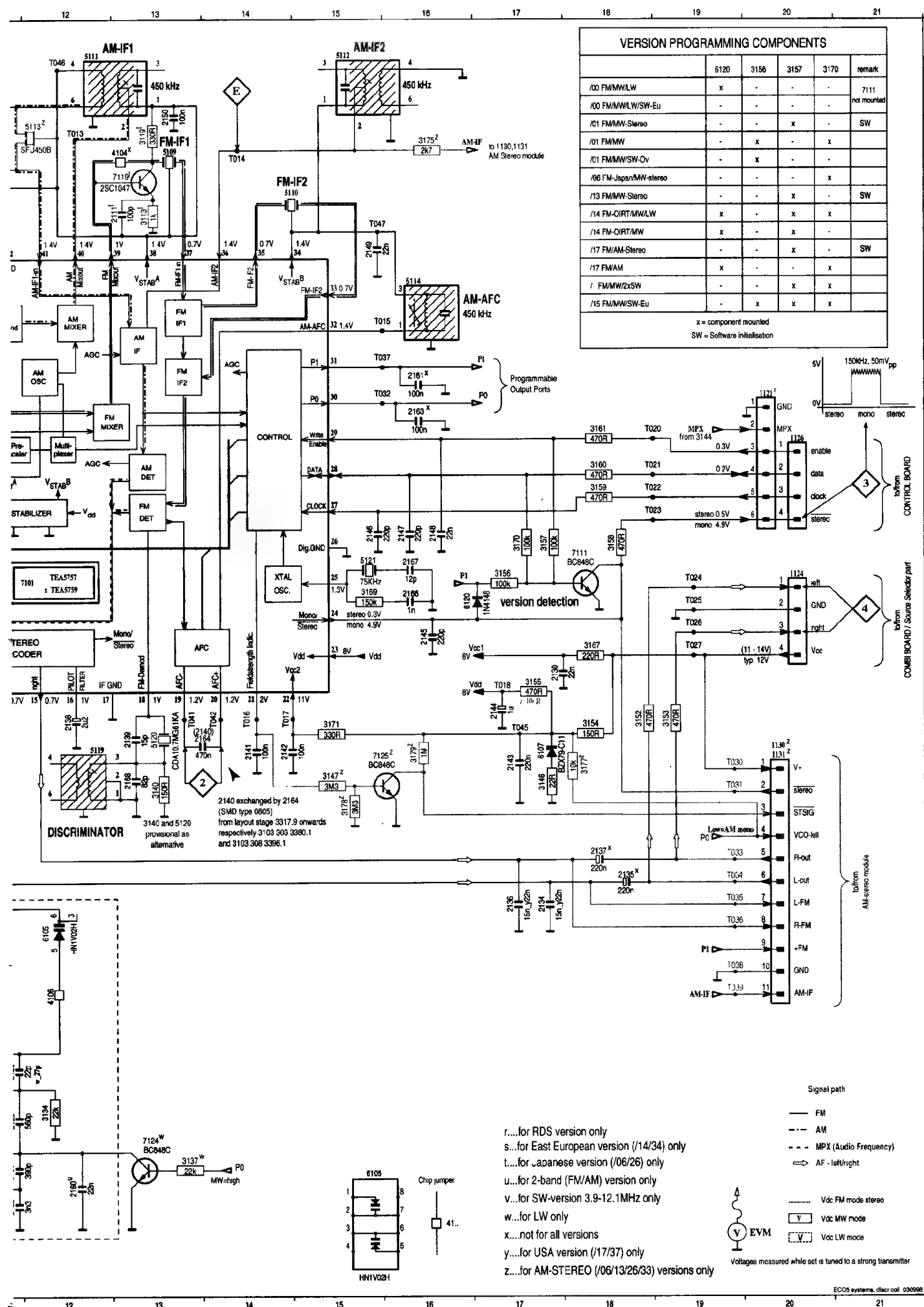
ECO5, disc. coil, 090797

Use service test program. By selecting the TUNER TEST test frequencies will be stored as preset frequencies automatically.

<sup>1)</sup> If sensitivity of frequency counter is too low adjust to max. channel separation  
(input signal: stereo left 90% + 9%, adjust output on right channel to minimum)<sup>3)</sup> For AM RF adjustments the original frame antenna has to be used !<sup>2)</sup> RC network serves for damping the IF-filter while adjusting the other one.<sup>4)</sup> MW has to be aligned before LW. Repeat

## TUNER BOARD ECO5 / Systems





**ELECTRICAL PARTS LIST - ECO5 TUNER BOARD****MISCELLANEOUS**

1101	4822 267 31505	Antenna Socket 300R	
1102	4822 267 10283	Antenna Socket Coax IEC 75R	

**CAPACITORS**

2101	5322 122 32531	100pF 5% 50V	
2101	4822 126 13692	47pF 1% 63V	for USA
2102	4822 122 33177	10nF 20% 50V	
2103	5322 122 34123	1nF 10% 50V	
2104	4822 122 33195	100pF 10% 50V	
2106	4822 125 50355	Trimmer 4-20pF	for LW version
2106	4822 125 60101	Trimmer 3-11pF 100V	
2107	4822 121 51319	1μF 10% 63V	
2108	5322 122 32531	100pF 5% 50V	for LW version
2109	5322 122 32448	10pF 5% 50V	for LW version
2120	4822 126 13691	27pF 1% 63V	for LW version
2120	5322 122 32658	22pF 5% 50V	
2122	4822 122 33891	3,3nF 10% 63V	for LW version
2125	4822 121 51381	560pF 5% 400V	
2126	5322 122 31863	330pF 5% 50V	
2127	4822 126 13473	220nF +80/-20% 50V	
2128	4822 124 41579	10μF 20% 50V	
2129	4822 124 41584	100μF 20% 10V	
2130	4822 126 11585	22nF+80/- 20% 25V	
2131	4822 122 33325	470nF 16V	
2132	4822 122 33325	470nF 16V	
2131	4822 126 13482	470nF +80/- 20% 16V	
2132	4822 126 13482	470nF +80/- 20% 16V	
2133	4822 124 40242	1μF 20% 63V	
2134	4822 126 13188	15nF 5% 63V	
2134	5322 122 32654	22nF 10% 63V	for USA
2135	4822 124 40746	0,22μF 20% 63V	
2136	4822 126 13188	15nF 5% 63V	
2136	5322 122 32654	22nF 10% 63V	for USA
2137	4822 124 40746	0,22μF 20% 63V	
2138	4822 124 41576	2,2μF 20% 50V	
2139	4822 126 14236	50V 15pF 5%	
2140	4822 121 51252	470nF 5% 63V	
2141	4822 126 10002	100nF 20% 25V	
2142	4822 126 10002	100nF 20% 25V	
2143	4822 126 13473	220nF +80/-20% 50V	
2144	4822 124 40242	1μF 20% 63V	
2145	4822 122 33575	220pF 5% 50V	
2146	4822 122 33575	220pF 5% 50V	
2147	4822 122 33575	220pF 5% 50V	
2148	4822 126 11585	22nF+80/- 20% 25V	
2149	5322 122 32654	22nF 10% 63V	
2150	4822 122 31947	100nF 20% 63V	
2152	5322 116 80853	560pF 5% 63V	for East. Europe
2152	4822 126 12105	33nF 5% 63V	
2153	4822 122 32139	12pF 2% 63V	for East. Europe
2153	4822 122 32504	15pF 2% 63V	
2155	4822 125 60101	Trimmer 3-11pF 100V	

2158	5322 122 32448	10pF 5% 50V	for LW version
2159	5322 122 32659	33pF 5% 50V	
2160	5322 122 32654	22nF 10% 63V	
2161	4822 126 10002	100nF 20% 25V	
2163	4822 126 10002	100nF 20% 25V	
2164	4822 126 13482	470nF +80/- 20% 16V	
2165	4822 126 10002	100nF 20% 25V	
2166	5322 122 34123	1nF 10% 50V	
2167	4822 122 32139	12pF 2% 63V	
2168	4822 126 13695	82pF 1% 63V	

**RESISTORS**

3101	4822 051 20562	5k6 5% 0,1W	for East. Europe
3101	4822 051 20333	33k 5% 0,1W	
3102	4822 051 20104	100k 5% 0,1W	
3103	4822 117 10965	18k 1% 0,1W	
3104	4822 117 11448	180R 1% 0,1W	
3105	4822 116 83872	220R 5% 0,5W	
3108	4822 117 11449	2k2 1% 0,1W	for LW version
3109	4822 051 20472	4k7 5% 0,1W	for LW version
3110	4822 116 52195	47R 5% 0,5W	
3120	4822 051 20008	0R Jumper 0805	
3123	4822 051 20472	4k7 5% 0,1W	for LW version
3125	4822 117 10833	10k 1% 0,1W	for LW version
3128	4822 117 11449	2k2 1% 0,1W	for LW version
3132	4822 116 52195	47R 5% 0,5W	
3134	4822 051 20223	22k 5% 0,1W	
3137	4822 051 20223	22k 5% 0,1W	for LW version
3140	4822 051 20008	0R Jumper 0805	
		5120=CDA10.7MG40K	
3140	4822 117 10353	150R 1% 0,1W	
		5120=CDA10.7MG61KA	
3141	4822 051 20563	56k 5% 0,1W	
3142	4822 100 11163	Trimmer 100k 30% 0,1W	
3143	4822 051 20223	22k 5% 0,1W	for RDS version
3144	4822 051 10102	1k 2% 0,25W	for RDS version
3145	4822 117 11449	2k2 1% 0,1W	
3146	4822 051 20229	22R 5% 0,1W	
3152	4822 116 83883	470R 5% 0,5W	
3153	4822 051 20471	470R 5% 0,1W	
3154	4822 116 83868	150R 5% 0,5W	
3155	4822 051 20471	470R 5% 0,1W	
3156	4822 051 20104	100k 5% 0,1W	for /21/30/33 only
3157	4822 116 52234	100k 5% 0,5W	for East. Europe
3158	4822 116 83883	470R 5% 0,5W	
3159	4822 116 83883	470R 5% 0,5W	
3160	4822 116 83883	470R 5% 0,5W	
3161	4822 116 83883	470R 5% 0,5W	
3167	4822 117 11503	220R 1% 0,1W	
3169	4822 051 20154	150k 5% 0,1W	
3170	4822 116 52234	100k 5% 0,5W	
3171	4822 116 52219	330R 5% 0,5W	

**ELECTRICAL PARTS LIST - ECO5 TUNER BOARD**

3176	4822 051 10102	1k 2% 0,25W	for RDS version	7102	4822 130 60093	2SA838B	
3180	4822 051 20223	22k 5% 0,1W	for LW version	7103	4822 130 42513	BC858C	for RDS version
4101	4822 051 20008	0R Jumper 0805	for 2-Band only	7104	5322 130 44779	BC338-40	for LW version
4102	4822 051 20008	0R Jumper 0805	for 2-Band only	7105	5322 130 44779	BC338-40	for LW version
4103	4822 051 20008	0R Jumper 0805		7109	5322 130 41983	BC858B	for LW version
4104	4822 051 20008	0R Jumper 0805		7111	5322 130 42136	BC848C	
4105	4822 051 20008	0R Jumper 0805		7122	5322 130 42136	BC848C	for LW version
4106	4822 051 20008	0R Jumper 0805		7124	5322 130 42136	BC848C	for LW version
4108	4822 051 20008	0R Jumper 0805					
4111	4822 051 20008	0R Jumper 0805		Note: Only the parts mentioned in this list are normal service spare parts.			
4120	4822 051 20008	0R Jumper 0805					
4150	4822 051 10008	0R Jumper 1206					
4151	4822 051 20008	0R Jumper 0805					
4152	4822 051 10008	0R Jumper 1206					
4153	4822 051 10008	0R Jumper 1206					
4154	4822 051 10008	0R Jumper 1206					
4155	4822 051 10008	0R Jumper 1206					
4156	4822 051 20008	0R Jumper 0805					
4157	4822 051 10008	0R Jumper 1206					
4158	4822 051 10008	0R Jumper 1206					
4159	4822 051 10008	0R Jumper 1206					
4162	4822 051 10008	0R Jumper 1206					

**COILS & FILTERS**

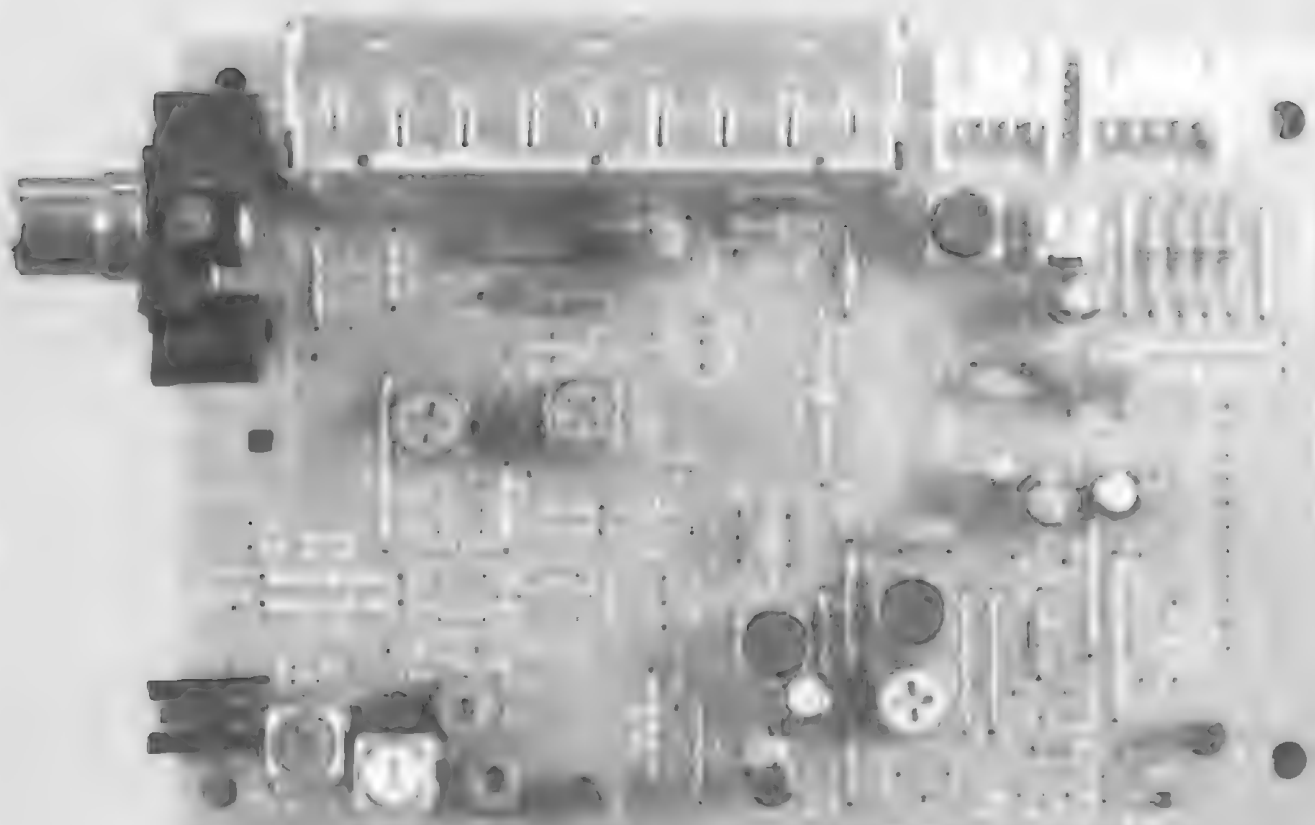
5102	4822 157 71634	MW RF Coil	
5103	4822 157 71635	LW RF Coil	for LW version
5109	4822 242 70665	Ceram Filter 10,7MHz	
5110	4822 242 70665	Ceram Filter 10,7MHz	
5111	4822 158 60511	AM-IF Filter 450kHz	
5112	4822 157 70302	AM-IF Filter 450kHz	
5114	4822 157 70302	AM-IF Filter 450kHz	
5119	4822 157 11443	Discriminator 10,7MHz	
5120	4822 242 82065	Cer. Disc. 10,7MG40K	
5120	4822 242 10251	Cer. Disc.10,7MG61KA-TF21	
5121	4822 242 10261	Quartz 75kHz	
5122	4822 157 60517	Osc. Coil LW	for LW version
5123	4822 157 60517	Osc. Coil MW	
5130	4822 156 30947	RF-Coil 1.5T	
5131	4822 156 30947	RF-Coil 1.5T	

**DIODES**

6103	4822 130 30621	1N4148	
6104	4822 130 30621	1N4148	
6105	4822 130 83075	HN1V02H-B	
6106	4822 130 30621	1N4148	
6107	4822 130 34488	BZX79-B11	
6120	4822 130 30621	1N4148	not for /21/30/33
6130	4822 130 82833	1SV228	
6131	4822 130 82833	1SV228	

**TRANSISTORS & INTEGRATED CIRCUITS**

7101	4822 209 90924	TEA5757H/V1	
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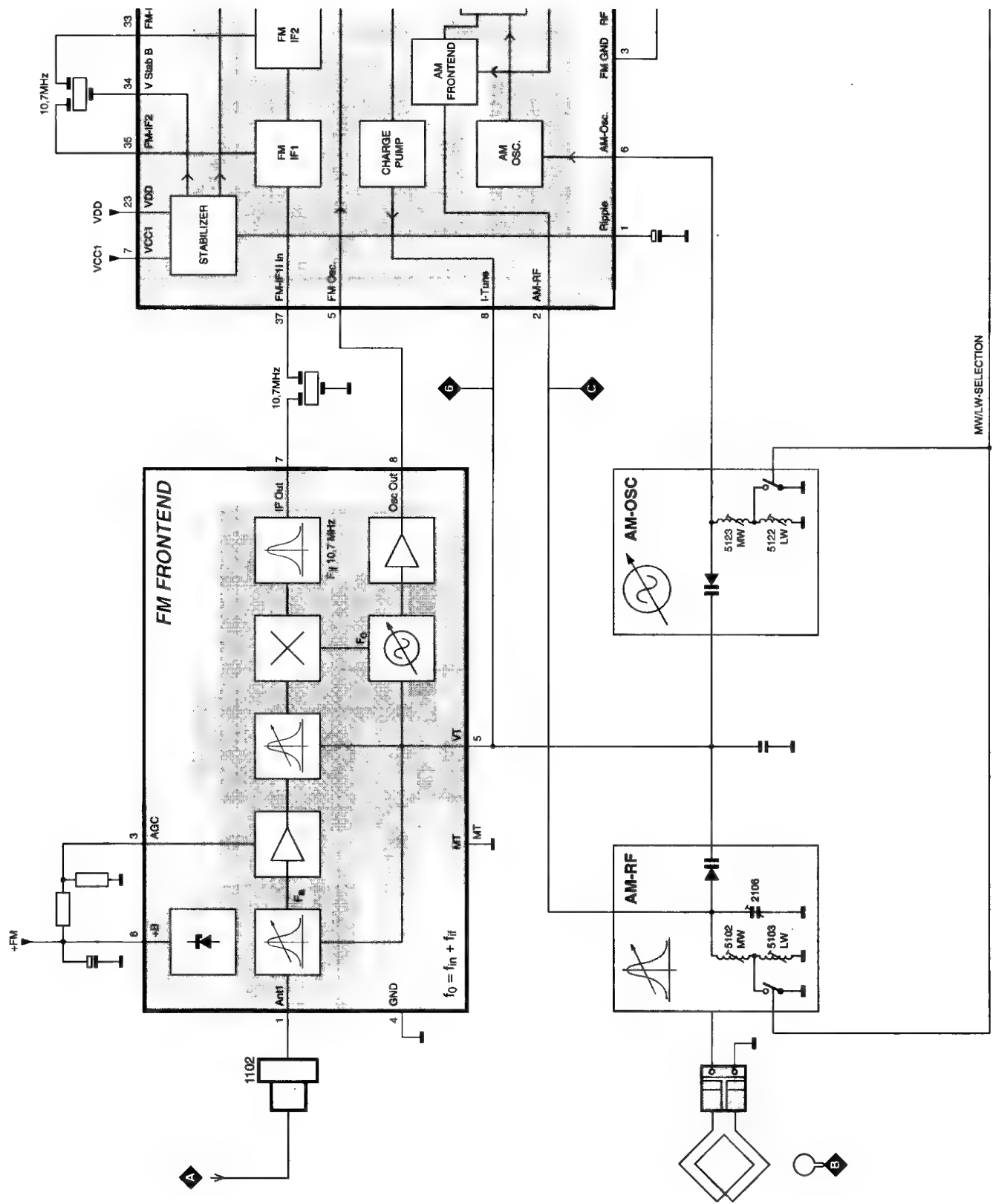
## ***TUNER 95 BOARD***

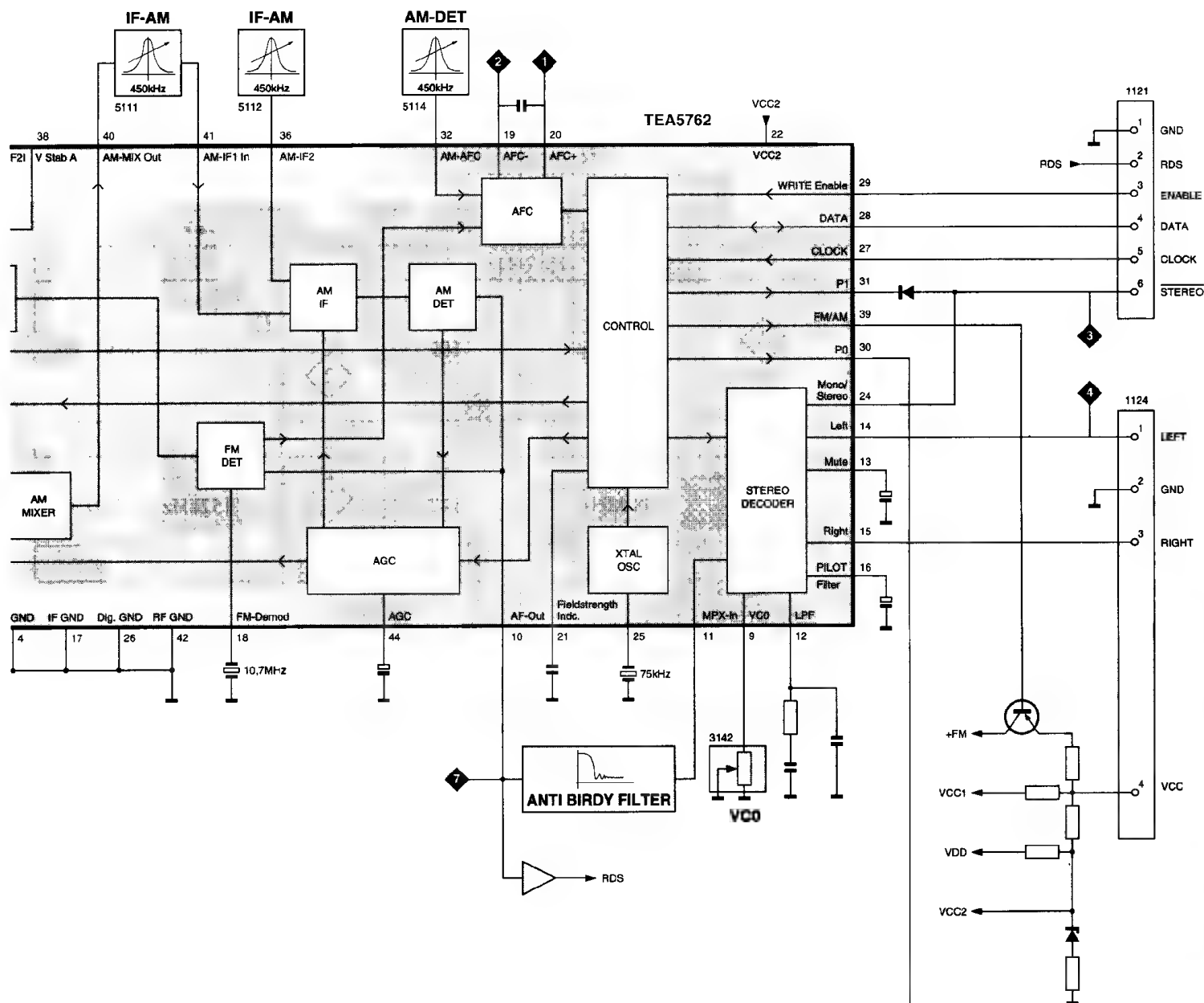
### **TABLE OF CONTENTS**

Block diagram .....	7D-1
Adjustment table .....	7D-2
Component layout .....	7D-2
Circuit diagram .....	7D-3
Part list .....	7D-4

# BLOCKDIAGRAM

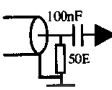


7D-1








**TUNER 95 bis Adjustment Table (FM, MW, LW with Frame antenna)**

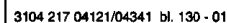
Waverange	Input frequency	Input	Set tuned to	Adjust	Output	Scope / Voltmeter
VARICAP ALIGNMENT						
FM (50)			108 MHz	check	6	7 ... 9V
87.5 - 108 MHz			87.5 MHz	check		1.3 ... 2V
MW (9)			1602 kHz	5123		8.3V ± 0.2V
531 - 1602 kHz			531 kHz	check		1V ± 0.4V
LW (3)			279 kHz	5122		8.3V ± 0.2V
153 - 279 kHz			153 kHz	check		1V ± 0.4V
FM - DETECTION						
FM	98 MHz 1mV continuous wave  short pin 21 (IC7101) to ground	A	98 MHz	5107	1 2	0mV ± 3mV
FM - VCO						
FM	98 MHz 1 mV  continuous wave	A	98 MHz	3142	3	152kHz ± 1 kHz
DISTORTION						
FM	98 MHz 1 mV 90 % L + 9 % pilot mod = 1kHz	A	98MHz	mixcoil inside Tuner 1110	4	Distortion minimum
AM - IF						
MW	450kHz Δf = 10kHz Low as possible Swept signal	  C	MW	5111	7	symmetrical and max. height 
	5112					
	450kHz continuous wave			5114	1 2	0mV ± 2mV
AM - RF						
MW	558kHz Mod = 1kHz 30 % AM 1494 kHz	B  *	558kHz	5102	7	MAX 
			1494kHz	2106		
LW	198kHz mod = 1kHz 30 % AM			198kHz		5103

\* Signal send via a frame antenna  
(..) = tuning grid in kHz

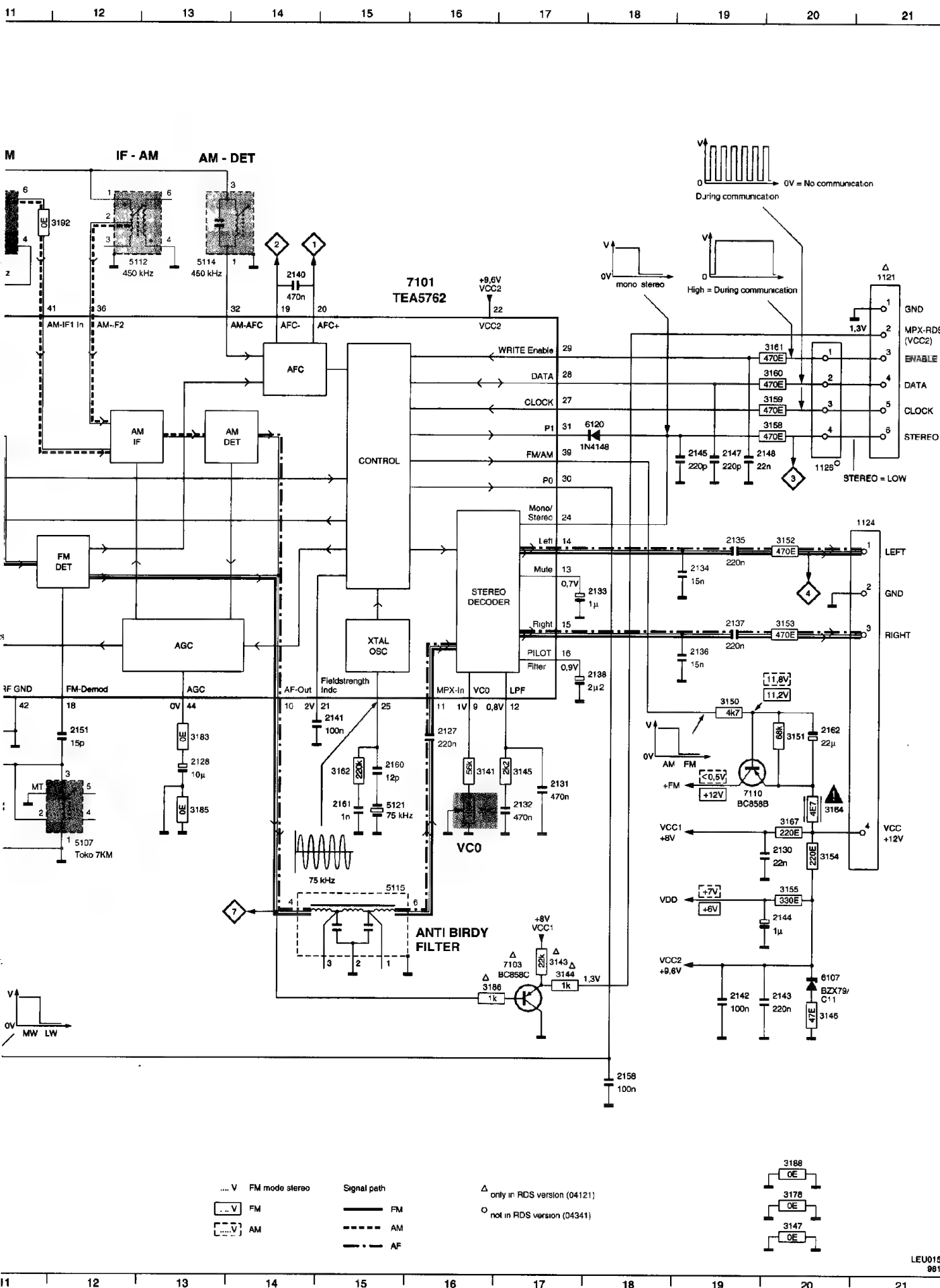
 repeat

adtable for 3104 217 04121/04341

A —  
B —  
C —  
D —  
E —  
F —  
G —  
H —  
I —  
J —  
K —  
L —  
M —  
N —



3141 I16 3145 I17 3151 I20 3155 J20 3161 D19 3167 I20 3177 M10 3184 I6 3192 C12 5107 J12 5112 C12 5122 L7 6106 H5 7103 K17 7110 I19  
 3142 I16 3146 L20 3152 F20 3158 E19 3162 I15 3169 L5 3178 N20 3185 I13 3197 L11 5109 B6 5114 C13 5123 K7 6107 K20 7104 J2 7122 L9  
 3143 K17 3147 N20 3153 G20 3159 E19 3163 J8 3172 B6 3181 C7 3186 K16 5102 I3 5110 C9 5115 J15 6105a I5 6120 E17 7105 K2 7124 L8  
 3144 K17 3150 H19 3154 J20 3160 D19 3164 I20 3173 B6 3183 I13 3188 M20 5103 L4 5111 C11 5121 I15 6105b I6 7101 C15 7109 L10



**ELECTRICAL PARTS LIST - TUNER 95 BOARD****MISCELLANEOUS**

1102	4822 267 10283	Socket Coaxial IEC 75R
1103	4822 265 31184	JST Connector 2 pin
1110	4822 210 10739	Frontend Assembly FE415-G23

**CAPACITORS**

2102	4822 124 40433	47μF 20% 25V
2106	4822 125 60102	Trimmer 5,2-30pF 100V
2107	4822 121 51252	470nF 5% 63V
2108	4822 126 13695	82pF 1% 63V
2109	4822 126 13691	27pF 1% 63V
2120	5322 122 32659	33pF 5% 50V
2122	5322 126 10465	3,9nF 10% 50V
2123	4822 121 10766	390pF 1% 630V
2125	4822 121 10578	560pF 1% 630V
2127	4822 122 32927	220nF +80/-20% 50V
2128	4822 124 41579	10μF 20% 50V
2129	4822 124 40242	1μF 20% 63V
2130	4822 126 11585	22nF +80/-20% 25V
2131	4822 122 33325	470nF 16V
2132	4822 122 33325	470nF 16V
2133	4822 124 40242	1μF 20% 63V
2134	4822 126 13188	15nF 5% 63V
2135	4822 122 32927	220nF +80/-20% 50V
2136	4822 126 13188	15nF 5% 63V
2137	4822 122 32927	220nF +80/-20% 50V
2138	4822 124 41576	2,2μF 20% 50V
2139	4822 126 10002	100nF 20% 25V
2140	4822 121 51252	470nF 5% 63V
2141	4822 122 31947	100nF 20% 63V
2142	4822 122 31947	100nF 20% 63V
2143	4822 122 32927	220nF +80/-20% 50V
2144	4822 124 40242	1μF 20% 63V
2145	4822 122 33575	220pF 5% 50V
2147	4822 122 33575	220pF 5% 50V
2148	4822 122 33809	22nF 20% 50V
2150	4822 122 31947	100nF 20% 63V
2151	4822 126 14236	15pF 5% 50V
2152	4822 126 13695	82pF 1% 63V
2158	4822 122 31947	100nF 20% 63V
2160	4822 122 32139	12pF 2% 63V
2161	5322 122 34123	1nF 10% 50V
2162	4822 124 81151	22μF 50V

**RESISTORS**

3103	4822 051 20008	0R Jumper 0805
3104	4822 051 10102	1k 2% 0,25W
3107	4822 051 20829	82R 5% 0,1W
3108	4822 117 11449	2k2 1% 0,1W
3109	4822 117 11449	2k2 1% 0,1W
3120	4822 051 20008	0R Jumper 0805
3123	4822 051 10008	0R Jumper 1206
3124	4822 051 10008	0R Jumper 1206

3125	4822 116 83864	10k 5% 0,5W
3128	4822 116 52256	2k2 5% 0,5W
3129	4822 051 20008	0R Jumper 0805
3130	4822 051 10008	0R Jumper 1206
3131	4822 051 10008	0R Jumper 1206
3132	4822 051 20008	0R Jumper 0805
3134	4822 051 20223	22k 5% 0,1W
3137	4822 117 10833	10k 1% 0,1W
3138	4822 051 20008	0R Jumper 0805
3139	4822 051 10008	0R Jumper 1206
3140	4822 051 20331	330R 5% 0,1W
3141	4822 117 11148	56k 1% 0,1W
3142	4822 100 11163	Trimmer 100k 30% 0,1W
3143	4822 051 20223	22k 5% 0,1W
3144	4822 051 10102	1k 2% 0,25W
3145	4822 117 11449	2k2 1% 0,1W
3146	4822 051 20479	47R 5% 0,1W
3147	4822 051 10008	0R Jumper 1206
3150	4822 051 20472	4k7 5% 0,1W
3151	4822 051 20683	68k 5% 0,1W
3152	4822 051 20471	470R 5% 0,1W
3153	4822 051 20471	470R 5% 0,1W
3154	4822 116 83872	220R 5% 0,5W
3155	4822 116 52219	330R 5% 0,5W
3158	4822 116 83883	470R 5% 0,5W
3159	4822 116 83883	470R 5% 0,5W
3160	4822 116 83883	470R 5% 0,5W
3161	4822 116 83883	470R 5% 0,5W
3162	4822 117 13579	220k 1% 0,1W
3163	4822 051 10008	0R Jumper 1206
3164	4822 052 10478	Δ 4R7 5% 0,33W
3165	4822 051 10008	0R Jumper 1206
3167	4822 116 83872	220R 5% 0,5W
3169	4822 051 20008	0R Jumper 0805
3171	4822 051 20008	0R Jumper 0805
3172	4822 051 10008	0R Jumper 1206
3173	4822 051 20008	0R Jumper 0805
3176	4822 051 20008	0R Jumper 0805
3177	4822 051 20223	22k 5% 0,1W
3178	4822 051 10008	0R Jumper 1206
3181	4822 051 10008	0R Jumper 1206
3183	4822 051 10008	0R Jumper 1206
3184	4822 051 10008	0R Jumper 1206
3185	4822 051 10008	0R Jumper 1206
3186	4822 051 10102	1k 2% 0,25W
3188	4822 051 10008	0R Jumper 1206
3192	4822 051 20008	0R Jumper 0805
3197	4822 051 20472	4k7 5% 0,1W

**COILS & FILTERS**

5102	4822 157 71634	MW Aerial
5103	4822 157 71635	LW Aerial

**ELECTRICAL PARTS LIST - TUNER 95 BOARD**

---

5107	4822 157 11443	FM Discriminator 10,7MHz
5109	4822 157 71639	Ceram Filter 10,7MHz
5110	4822 242 70665	Ceram Filter 10,7MHz
5111	4822 158 60511	AM-IF Filter 450kHz
5112	4822 157 70302	AM-IF Filter 450kHz
5114	4822 157 70302	AM_IF Filter 450kHz
5115	4822 157 71636	Anti-Birdy Filter
5121	4822 242 10261	X'tal Resonator 75kHz
5122	4822 157 60517	RF Coil AM
5123	4822 157 60517	RF Coil AM

**DIODES**

---

6105	4822 130 83075	HN1V02H-B
6106	4822 130 30621	1N4148
6107	4822 130 34488	BZX79-C11
6120	4822 130 30621	1N4148

**TRANSISTORS & INTEGRATED CIRCUITS**

---

7101	4822 209 90315	TEA5762H/V1
7103	4822 130 42513	BC858C
7104	5322 130 44779	BC338-40
7105	5322 130 44779	BC338-40
7109	5322 130 41983	BC858B
7110	5322 130 41983	BC858B
7122	5322 130 42136	BC848C
7124	5322 130 42136	BC848C

Note : Only the parts mentioned in this list are normal service spare parts.

---

# ETF6-FE TAPE MODULE

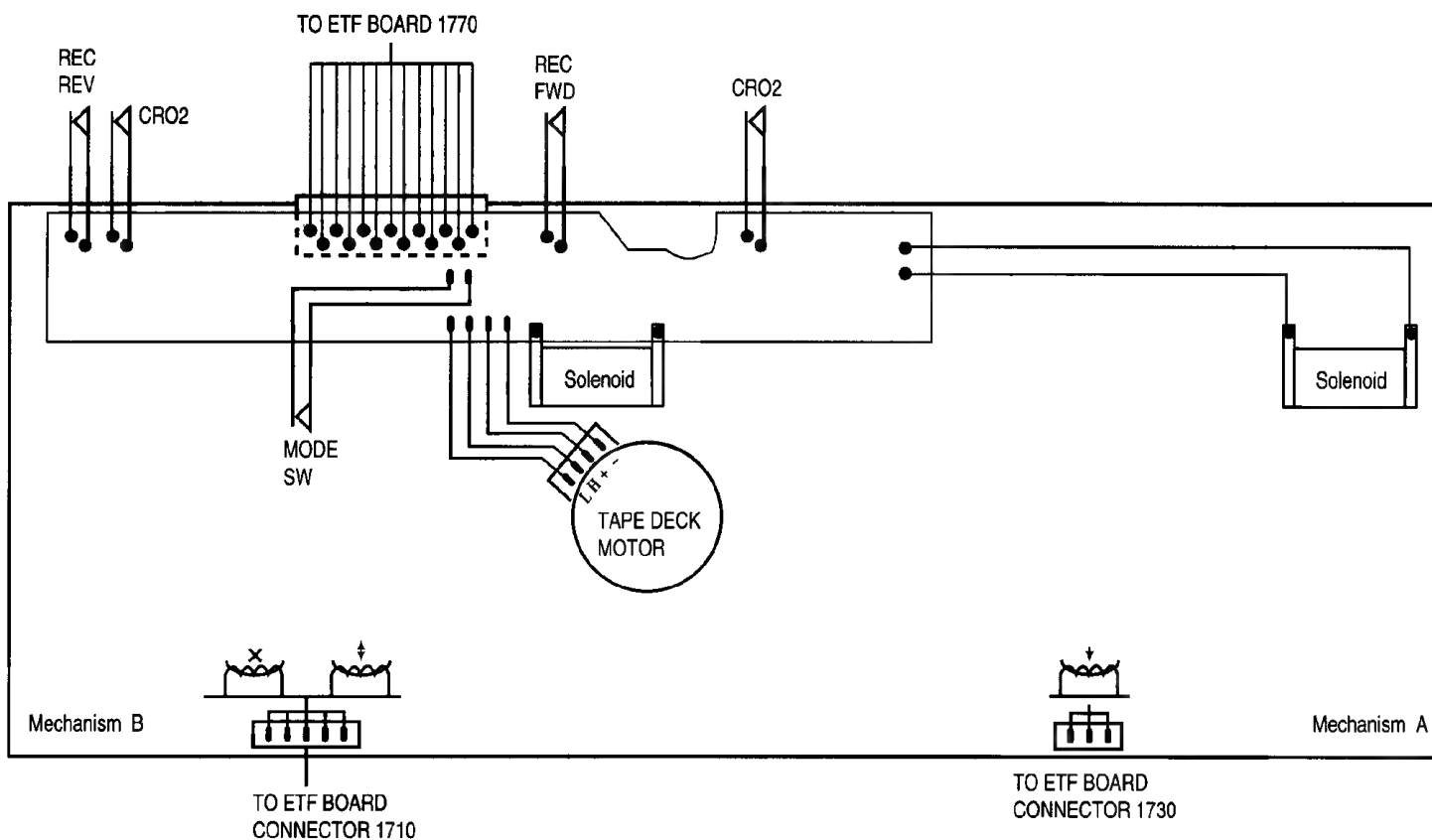
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## *(Non-Dolby Version)*

### TABLE OF CONTENTS

Tape Module Wiring & variation table .....	9-1
Block diagram .....	9-2
Brief Introduction .....	9-3
Connector assignment.....	9-4
Tape deck electronics & Tape adjustments .....	9-5
ETF6-FE Non-dolby board layouts .....	9-6
Analog Circuit diagram .....	9-7
Servo Circuit diagram .....	9-8
Exploded views & parts list.....	9-9
Electrical parts list.....	9-13

## Tapedeck wiring (Double deck)



### OPTIONS / VARIANTS TABLE

MODULE	ETF6-FE	
VARIANT	1	2
NAME	ND/DD/FR	ND/DD/FF
Deck configuration	double	double
Autoreverse	yes (B)	no
Auto-replay	no	yes (B)
Motor configuration	single	single
Auto tape type selection	yes	yes
Dolby B type Noise Reduction	no	no
19 kHz pilot suppression	no	no
High speed dubbing	yes	yes

DB = Dolby B NR  
 DD = Double Deck  
 FF = Non-Autoreverse  
 FR = Autoreverse Deck B  
 ND = Non-Dolby  
 SD = Single Deck

### Variations table for Analog Circuit

	Autoreverse	Non-autoreverse
	ND/DD/FR	ND/DD/FF
1760	-	-
1770	use	use
3723	12k	15k
3724	12k	15k
3743	1k2	1k
3744	1k2	1k
3769	12k	8k2
3772	4k7	5k6
3774	10k	8k2



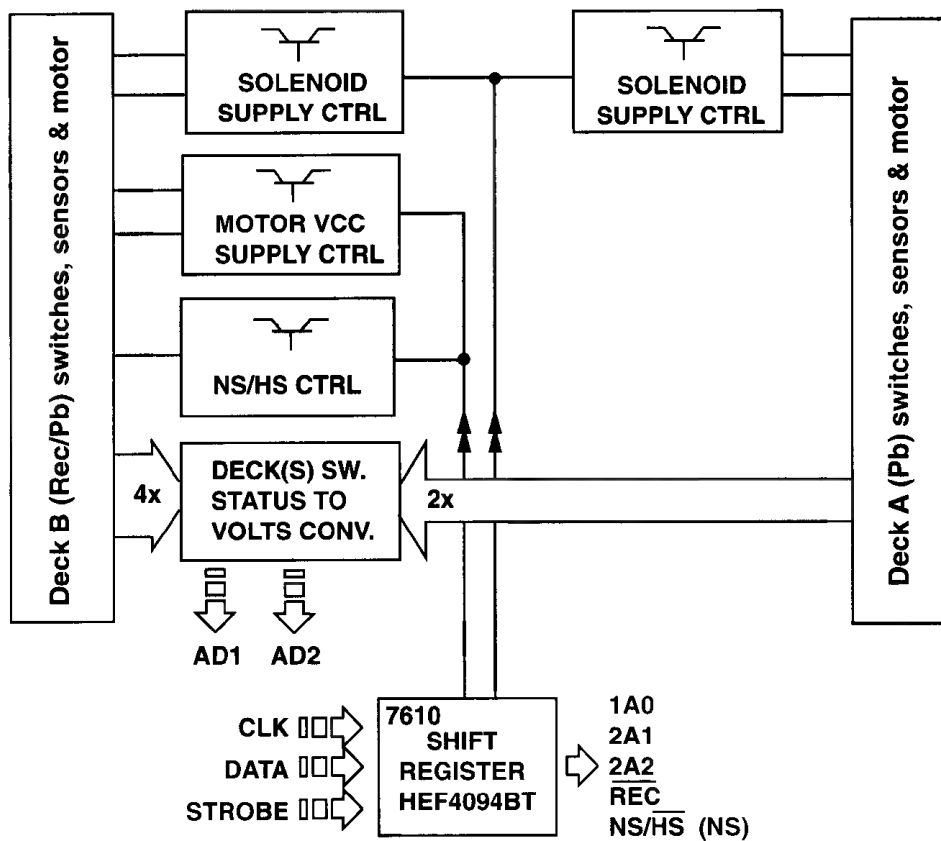
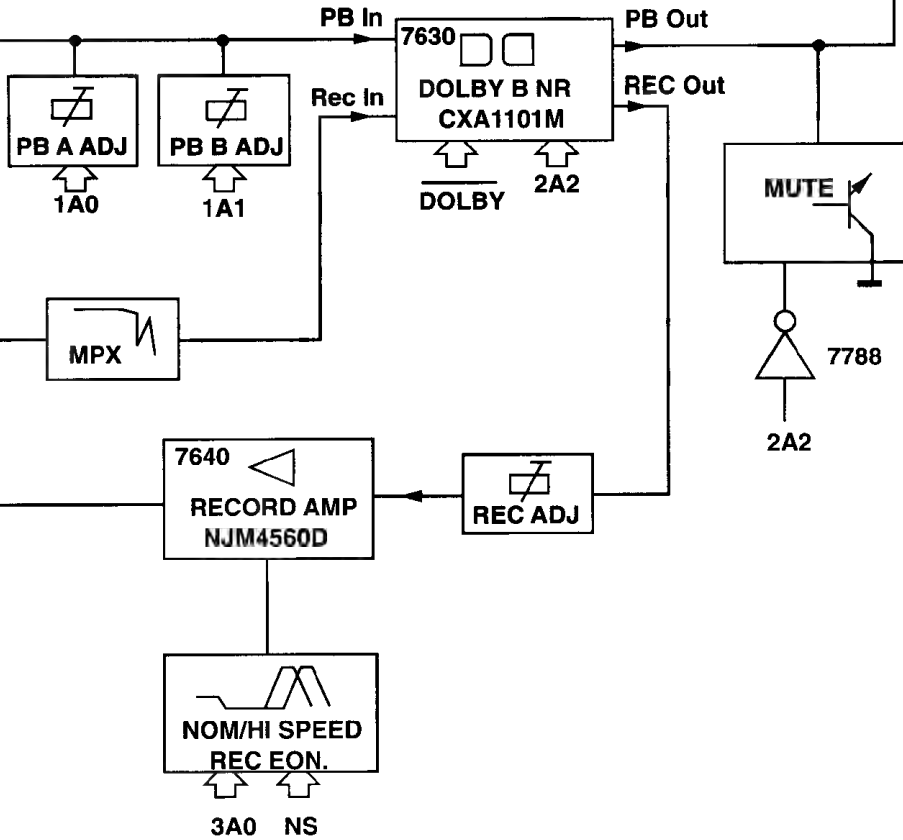


9792 #

PB Out

ATTEN

For Dolby version only



## Brief introduction

### General

#### 1. Playback Mode

Signal from the playback head Deck A or Deck B is selected and fed through by the Mode Selector IC7710 (HEF4952B). The signal is amplified by amplifier IC7720 (AN7318S) before feeding to the IC7740 (HEF4952B) and out to the AF Board via connector 1701.

#### 2. Recording Mode

Recording Signal is selected and fed through by the Mode Selector IC7710 (HEF4952B) which is then amplified by the amplifier IC7720 (AN7318S). The amplified output signal will pass through IC7730 (HEF4952B) for record equalization and back to IC7710 (HEF4952B) before registered into the Rec/PB Head of Deck B.

#### 3. Dubbing Mode

In Dubbing mode, signal from the playback head Deck A is selected and fed through by the Mode Selector IC7710 (HEF4952B) which is then equalised for playback mode by the amplifier IC7720 (AN7318S) so that a flat response is obtained after the pre-amp. The equalised signal will then follow the same path as in the Recording mode.

#### 4. Mode Selector

The Mode Selector IC7710 (HEF4952B) caters for 4 inputs signal, namely Playback Signal from Deck A, Playback Signal from Deck B, Recording Signal and Dubbing Signal.

#### 5. Amplifier PB/REC

Amplifier IC7720 (AN7318S) is for the purpose of amplifying the Playback and Recording signal from the Mode Selector.

#### 6. Automatic Level Control (ALC)

ALC circuit consists of resistors (3760, 3765, 3766, 3767), capacitors (2762, 2763) and control by transistor 7787 (BC847B). ALC limits the amplifier output to a constant value when input signal becomes too large, thus limiting recording current to below saturation level, to prevent recording distortion.

#### 7. Muting Circuit (For Non-Dolby only)

Switch S4 of the IC7740 (HEF4952B) is for the purpose of muting the output during Recording mode. During Recording mode, S4 is closed and shorted to the ground.

#### 8. IC7740 (HEF4952B)

The function of the IC7740 (HEF4952B) is to change time constant between 120us Ferro (IEC I) and 70us Chrome (IEC II) during playback mode. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II). This IC will switch to Flat Gain during the Recording mode.

#### 9. IC7730 (HEF4952B)

The function of the IC7730 (HEF4952B) is to change gain and time constant according to tape type and recording speed to boost recording current at higher frequency during recording to compensate for head loss. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II).

#### 10. Bias Level

Bias Level making use of the Variable resistor (3773) for adjusting the optimal level of the bias current for Ferro or Chrome.

#### 11. Bias Symm (For Dolby only)

Bias Symm making use of the Variable resistor (3785) to adjust the bias current for the left and the right channel to be equal.

#### 12. PB Switch

Playback Switch which consists of the FETs 7785 (For Dolby only) & 7786 (J111) is for the purpose of providing a virtual ground for the Rec/PB Head (Deck B) during Playback mode. During the Playback mode, the FETs are turn on and shorted pin 2 and 4 of connector 1720 to the ground. During Recording mode, the FETs are turn off to allow the oscillator signal to be superposition onto the Recording signal for recording.

13. Motor Speed

During High speed dubbing, a feedback signal from the uP through pin 03 of the IC7610 (HEF4094BT) will trigger the transistors 7622 (BC847B) and 7616 (BC857B) to cause a change in the voltage level between High and Low, thus changing the speed of the motor.

14. IC7610 (HEF4094BT)

IC7610 (HEF4094BT) is a Shift Register use for issues the logic for cmos switch ICs (HEF4952B) via 1A0, 2A1 and 2A2. It also issues logic to On/Off SOL\_A, SOL\_B and MOT. Recording speed is controlled via NS/HS.

**Dolby Circuit (For sets with Dolby B NR only)**

15. IC7630 (CXA1551M)

IC7630 (CXA1101M) in the Dolby circuit is a Dolby Noise Reduction Type B IC for the Playback and Recording signal. Noise Reduction ON/OFF are controlled by DOLBY, which is from CLK, direct from uP. After clocking in DATA, CLK is set to HIGH/LOW for NR OFF/ON.

16. 19kHz Filter

The 19kHz filters 5631 & 5632 (LXD-210) in the Dolby circuit is for the purpose of filtering the 19kHz Pilot Tone (for Tuner signal only) of the Recording signal.

17. Level Adjust

The Variable resistor 3635, 3636, 3641 and 3642 in the Dolby circuit is for adjusting the playback level of the Dolby reference (400Hz, 200nWb/m). Transistor 7631, 7632 are ON to enable adjustment of 3641, 3642 during Playback Deck A. Transistor 7633, 7634 and 3635, 3636 are active for Playback Deck B.

18. Amplifier IC7640 (NJM4560M)

The Amplifiers 7640A & 7640B (NJM4560M) in the Dolby circuit is for the purpose of amplified the Recording signal.

19. Muting Circuit

The muting circuit which consists of transistors 7788, 7789 and 7790 (BC847B) is for the purpose of muting the output during Recording mode.

**NOTATIONS & ABBREVIATIONS USED IN THIS DOCUMENT**

CR	Chrome (IEC type II)
DB	Dolby NR type B
DD	Double Deck
DM	Double Motor
FE	Ferro (IEC type I)
FF	Non Auto Reverse
FR	Auto Reverse on Deck B
Gnd x	Ground x
HSD	High speed dubbing
ND	Non Dolby
NR	Noise Reduction
NSD	Normal speed dubbing
PB	Playback
REC	Record
S/A	Sub-assy
SD	Single Deck
SM	Single Motor

**CONNECTORS ASSIGNMENTS:****CONNECTOR 1701****INTERCONNECTION TO AF BOARD**

○	1	REC-L	Record input left
○	2	REC-R	Record input right
○	3	GND A	AF Ground
○	4	TAPE-L	Playback output left
○	5	+12V	D.C. supply (+12V) in
○	6	TAPE-R	Playback output right
○	7	-CMOS	Negative d.c. supply (-9V) for CMOS ICs

**CONNECTOR 1703****INTERCONNECTION TO AF BOARD**

○	1	GND M	Motor Ground
○	2	+MOTOR	D.C. supply (+12V) for tape deck motor & solenoid

**CONNECTOR 1706****INTERCONNECTION TO FRONT BOARD**

○	1	AD2	Deck sensing switches output voltage / Deck A EOT
○	2	AD1	Deck sensing switches output voltage / Deck B EOT
○	3	+5	DC supply +5V for ADC network
○	4	GND P	Control & Oscillator Ground
○	5	CLK	HEF4094BT shift register Clock line
○	6	DATA	HEF4094BT shift register Data line
○	7	STROBE	HEF4094BT shift register Strobe line

**CONNECTOR 1710****DECK B HEADS CONNECTOR (For ETF6... only)**

○	1	B R/P HD L+	R/P Head left channel positive
○	2	GND A	R/P Head return ground
○	3	B R/P HD R+	R/P Head right channel positive
○	4	ERASE HEAD	Erase Head
○	5	GND A	Erase Head ground

**CONNECTOR 1720****DECK B HEADS CONNECTOR (For ETF5... only)**

○	1	B R/P HD L+	R/P Head left channel positive
○	2	B R/P HD L-	R/P Head left channel negative
○	3	B R/P HD R+	R/P Head right channel positive
○	4	B R/P HD R-	R/P Head right channel negative
○	5	ERASE HEAD	Erase Head
○	6	GND A	Erase Head ground

**CONNECTOR 1730****DECK A HEAD CONNECTIONS (For Double Deck versions only)**

○	1	A PB HD L+	Pb Head left channel positive
○	2	GND A	Pb Head return ground shield
○	3	A PB HD R+	Pb Head right channel positive

**CONNECTOR 1740**

○ 1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
○ 2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
○ 3	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
○ 4	PHOTO B	Photo sensor output (tape movement indication)	
○ 5	SOL B	Solenoid supply	
○ 6	Vcc	Deck / Motor supply	
○ 7	MODE	Mode switch (head engagement)	[open=off: close=engaged]
○ 8	GND M	Deck / Motor ground	
○ 9	H	H pin for motor	
○ 10	L	L pin for motor	

**DECK B CONTROL INTERFACE (For ETF5... Double Deck only)****CONNECTOR 1750**

○ 1	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
○ 2	PHOTO A	Photo sensor output (tape movement indication)	
○ 3	SOL A	Solenoid supply	
○ 4	Vcc	Deck/Motor supply	
○ 5	MODE	Mode switch (head engagement)	[open=off: close=engaged]
○ 6	GND M	Deck/Motor ground	

**DECK A CONTROL INTERFAC (For ETF5... Double Deck only)****CONNECTOR 1760**

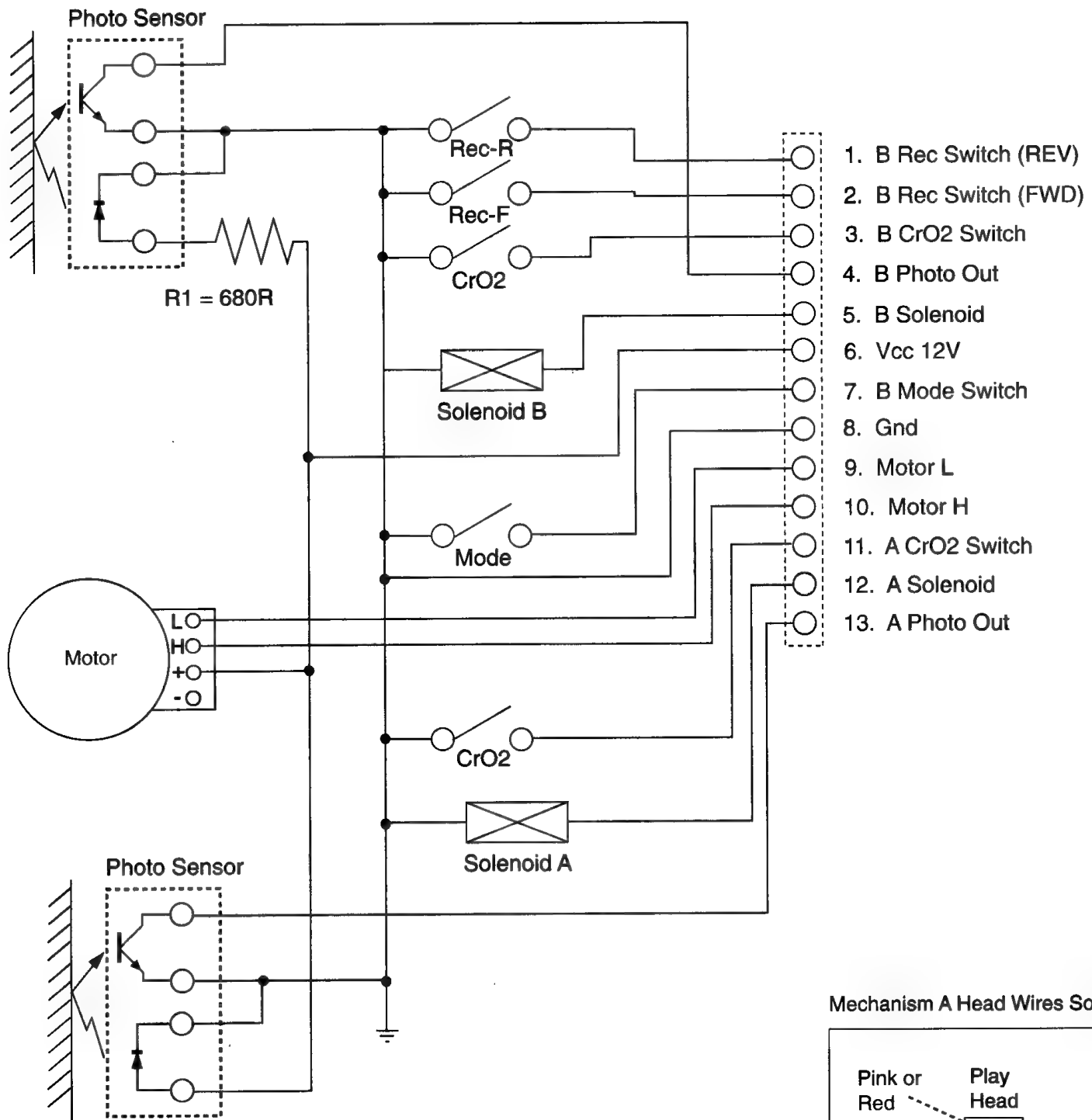
○ 1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
○ 2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
○ 3	CrO2	Chrome tape detection switch	[open=Cr: close=Fe]
○ 4	PHOTO B	Photo sensor output (tape movement indication)	
○ 5	SOL B	Solenoid supply	
○ 6	Vcc	Deck / Motor supply	
○ 7	MODE	Mode switch (head engagement)	[open=off: close=engaged]
○ 8	GND M	Deck / Motor ground	

**DECK B CONTROL INTERFACE (For Single Deck only)****CONNECTOR 1770**

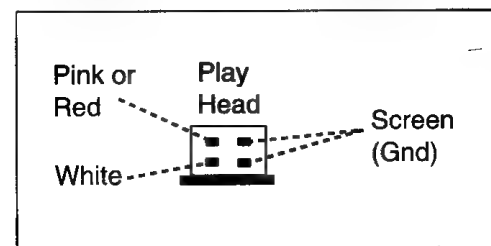
○ 1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
○ 2	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
○ 3	CrO2 B	Chrome tape detection switch deck B	[open=Cr: close=Fe]
○ 4	PHOTO B	Photo sensor output (tape movement indication)	
○ 5	SOL B	Solenoid supply for deck B	
○ 6	Vcc	Deck / Motor supply	
○ 7	MODE B	Mode switch (head engagement)	[open=off: close=engaged]
○ 8	GND M	Deck / Motor ground	
○ 9	L	L pin for motor	
○ 10	H	H pin for motor	
○ 11	CrO2 A	Chrome tape detection switch deck A	[open=Cr: close=Fe]
○ 12	SOL A	Solenoid supply for deck A	
○ 13	PHOTO A	Photo sensor output (tape movement indication)	

**DECK A & B CONTROL INTERFACE (For ETF6... only)**

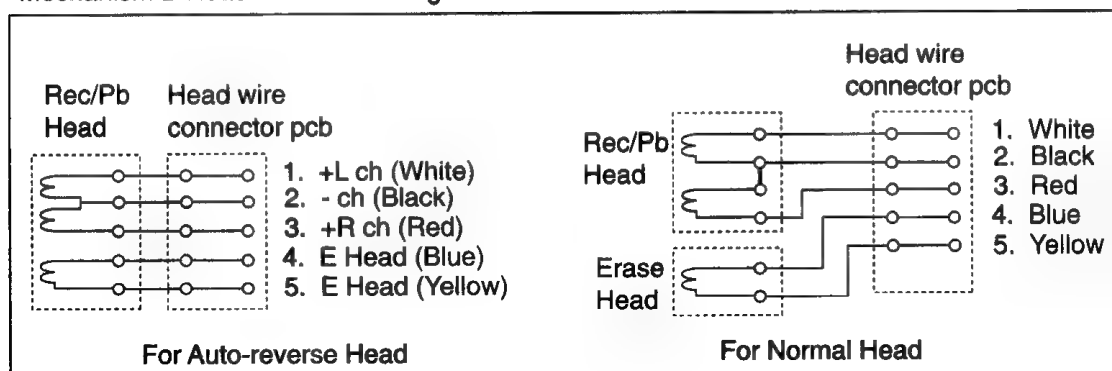
## TAPE MECHANISM ELECTRONICS



Mechanism A Head Wires Soldering



Mechanism B Head Wires Soldering



# TAPE ADJUSTMENT & CHECK TABLE

	TEST CASSETTE	RECORDER MODE	MEASURE ON	READ ON	ADJUST	
					with	to
ADJUST MOTOR SPEED						
NORMAL SPEED	SBC420 3150Hz	PLAY B	1 or 2 LEFT RIGHT	frequency counter	3620	3150Hz ± 0.5%
		PLAY A			check	3150Hz -0.8/+1.8%
CHECK WOW & FLUTTER						
DECK A & B	SBC420 3150Hz	PLAY	1 or 2 LEFT RIGHT	W&F-meter	check	≤0.4 % DIN
ADJUST AZIMUTH						
DECK A & B	SBC420 10kHz	PLAY FWD	1 or 2 LEFT RIGHT	mV-meter	left hand screw	max. output level & left=right
		PLAY REV #			right hand screw	
CHECK PLAYBACK FREQUENCY RESPONSE						
DECK A & B	SBC420	PLAY	1 or 2 LEFT RIGHT	mV-meter	check	limits see fig.1
ADJUST BIAS CURRENT						
DECK B	SBC419A	RECORD	5 or 6 LEFT RIGHT	mV-meter	3773	995mV
	SBC420				check	750mV ± 1.5dB
CHECK OVERALL FREQUENCY RESPONSE AND DISTORTION						
Inject 3mV signals 100Hz, 250Hz, 1kHz, 10kHz, 12.5kHz via 3 or 4	SBC419A or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	1 or 2 LEFT RIGHT	mV-meter	check	limits see fig. 2 *
Inject 1kHz 8.85mV via 3 or 4	SBC419A or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	1 or 2 LEFT RIGHT	THD-meter	check	≤3% *

SBC419A : 4822 397 30069

SBC420 : 4822 397 30071

# For Auto-reverse version only

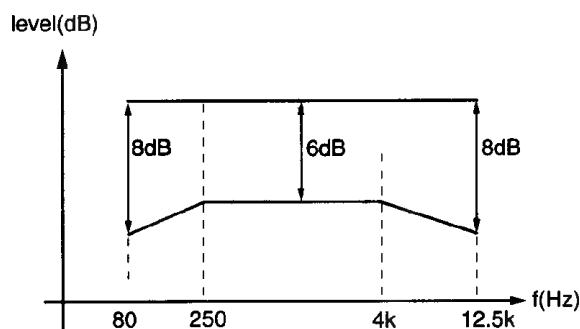
\* If high frequencies are not within limits, decrease bias and re-measure.  
If distortion is too high, increase bias and re-measure

figure. 1

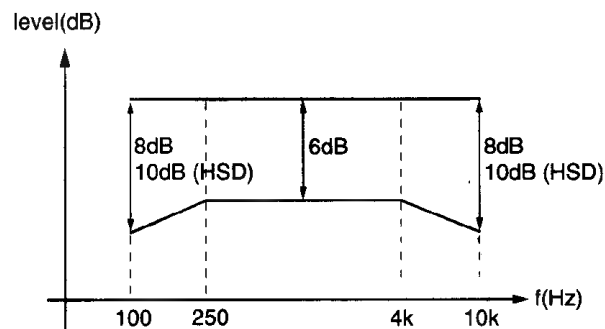
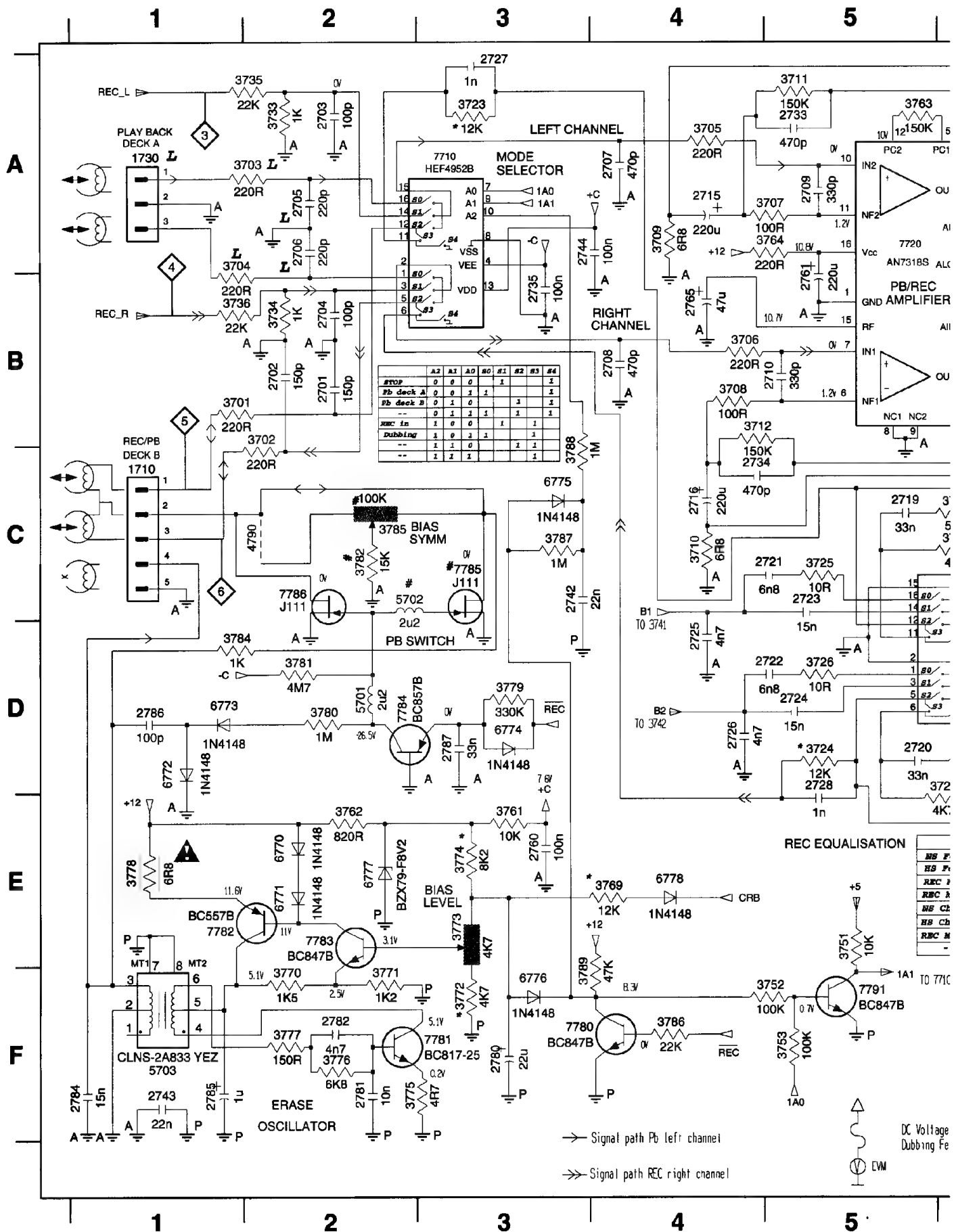
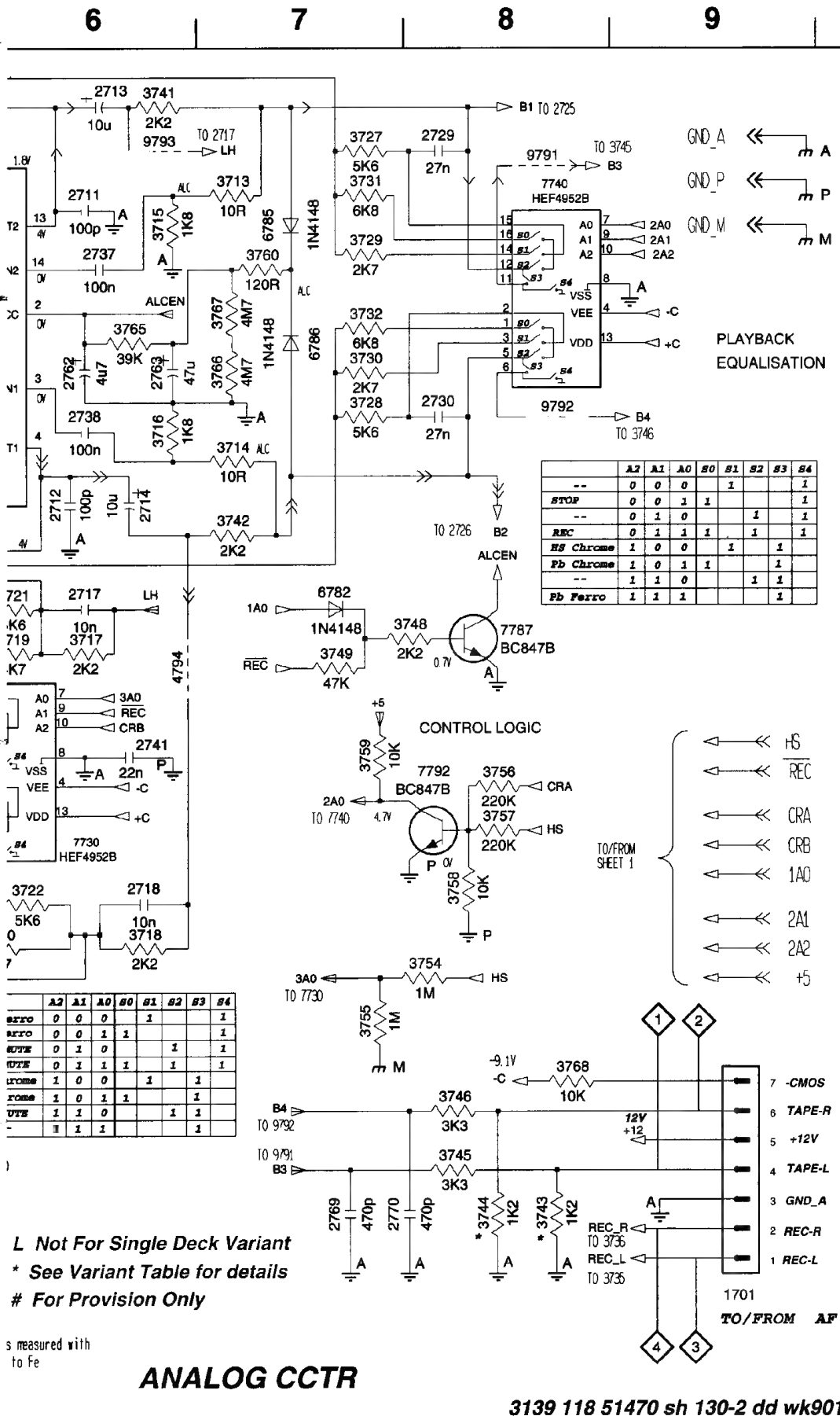


figure. 2

## ANALOG CIRCUIT



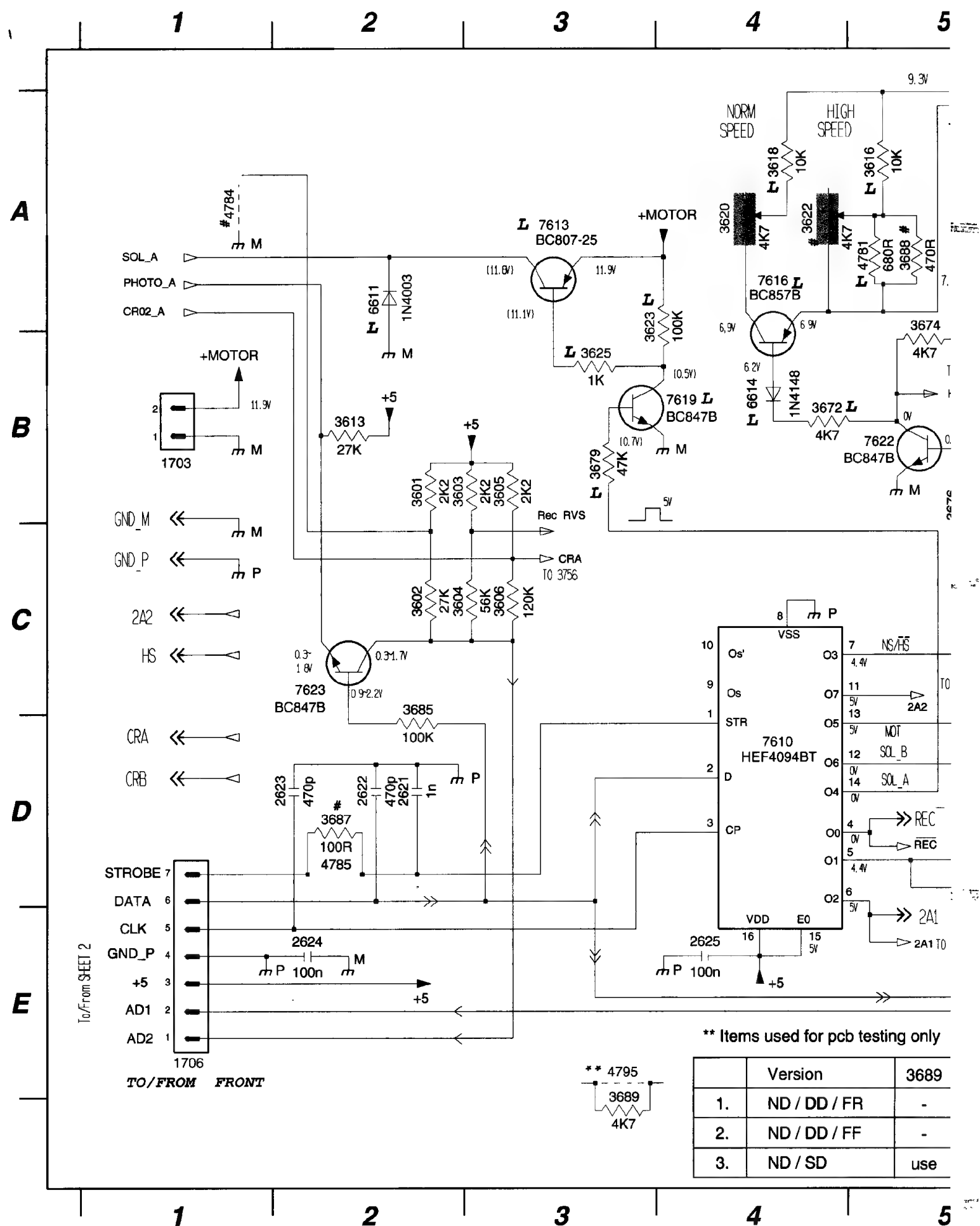




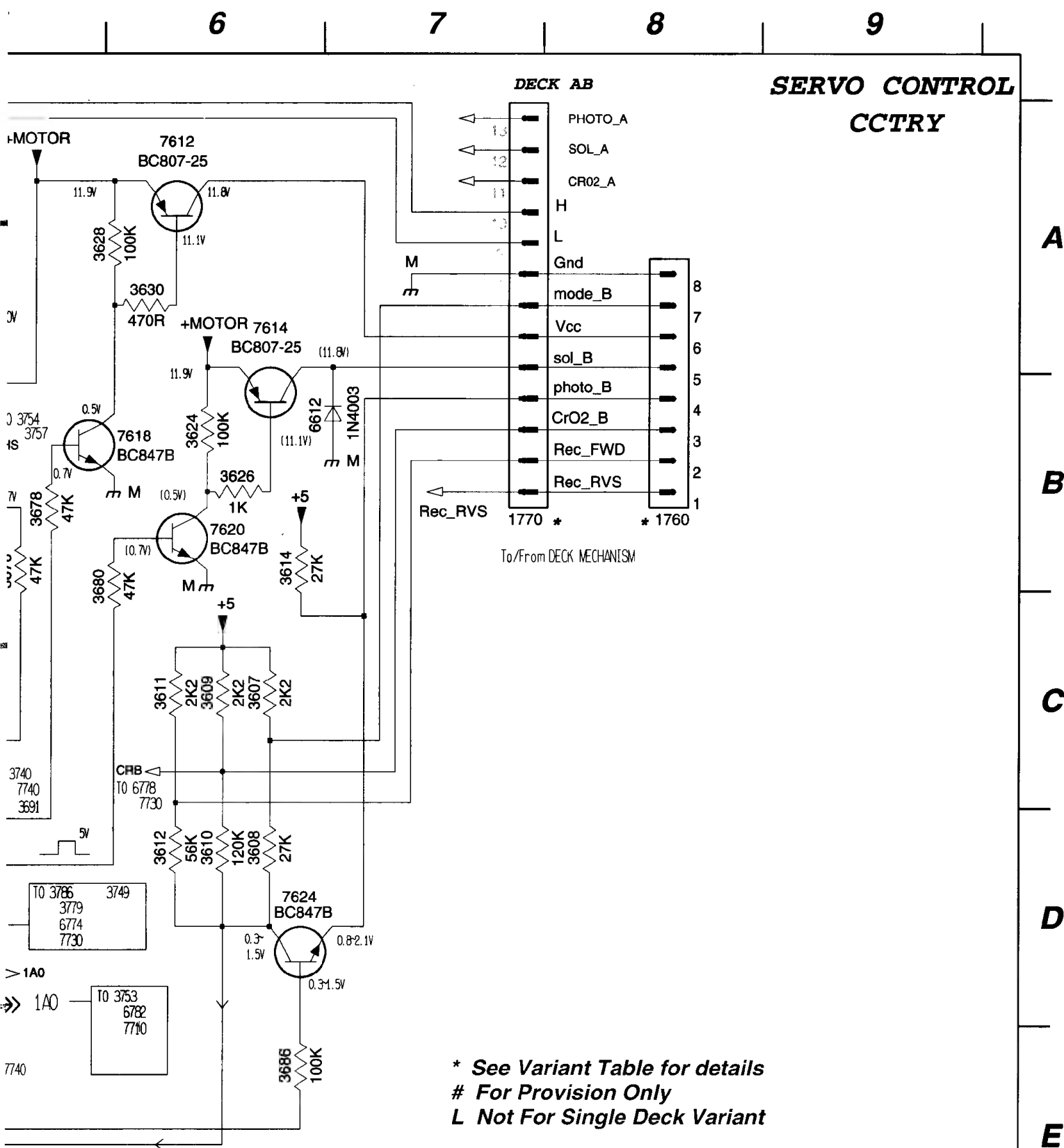
1701 F9	3716 B6	5703 F1
1710 C1	3717 C6	6770 E2
1730 A1	3718 D6	6771 E2
2701 B2	3719 C6	6772 D1
2702 B2	3720 D6	6773 D1
2703 A2	3721 C6	6774 D3
2704 B2	3722 D6	6775 C3
2705 A2	3723 A3	6776 F3
2706 A2	3724 D5	6777 E2
2707 A4	3725 C5	6778 E4
2708 B4	3726 D5	6782 C7
2709 A5	3727 A7	6785 A7
2710 B5	3728 B7	6786 B7
2711 A6	3729 A7	7710 A3
2712 B6	3730 B7	7720 A5
2713 A6	3731 A7	7730 D6
2714 B6	3732 A7	7740 A8
2715 A4	3733 A2	7780 F4
2716 C4	3734 B2	7781 F3
2717 C6	3735 A2	7782 E1
2718 D6	3736 B1	7783 E2
2719 C5	3741 A6	7784 D2
2720 D5	3742 B7	7785 C3
2721 C5	3743 F8	7786 C2
2722 D5	3744 F8	7787 C8
2723 C5	3745 F8	7791 F5
2724 D5	3746 E8	7792 D8
2725 D4	3748 C8	9791 A8
2726 D4	3749 C7	9792 B8
2727 A3	3751 E5	9793 A6
2728 D5	3752 F5	
2729 A8	3753 F5	
2730 B8	3754 E8	
2733 A5	3755 E7	
2734 C4	3756 D8	
2735 B3	3757 D8	
2737 A6	3758 D8	
2738 B6	3759 D7	
2741 D6	3760 A7	
2742 C3	3761 E3	
2743 F1	3762 E2	
2744 A3	3763 A5	
2760 E3	3764 A5	
2761 B5	3765 B6	
2762 B6	3766 B7	
2763 B6	3767 A7	
2765 B4	3768 E8	
2769 F7	3769 E4	
2770 F7	3770 F2	
2780 F3	3771 F2	
2781 F2	3772 F3	
2782 F2	3773 E3	
2784 F1	3774 E3	
2785 F1	3775 F2	
2786 D1	3776 F2	
2787 D3	3777 F2	
3701 B1	3778 E1	
3702 B2	3779 D3	
3703 A2	3780 D2	
3704 A1	3781 D2	
3705 A4	3782 C2	
3706 B4	3784 D1	
3707 A5	3785 C2	
3708 B4	3786 F4	
3709 A4	3787 C3	
3710 C4	3788 C3	
3711 A5	3789 F3	
3712 B4	4790 C2	
3713 A7	4794 C6	
3714 B7	5701 D2	
3715 A6	5702 C2	

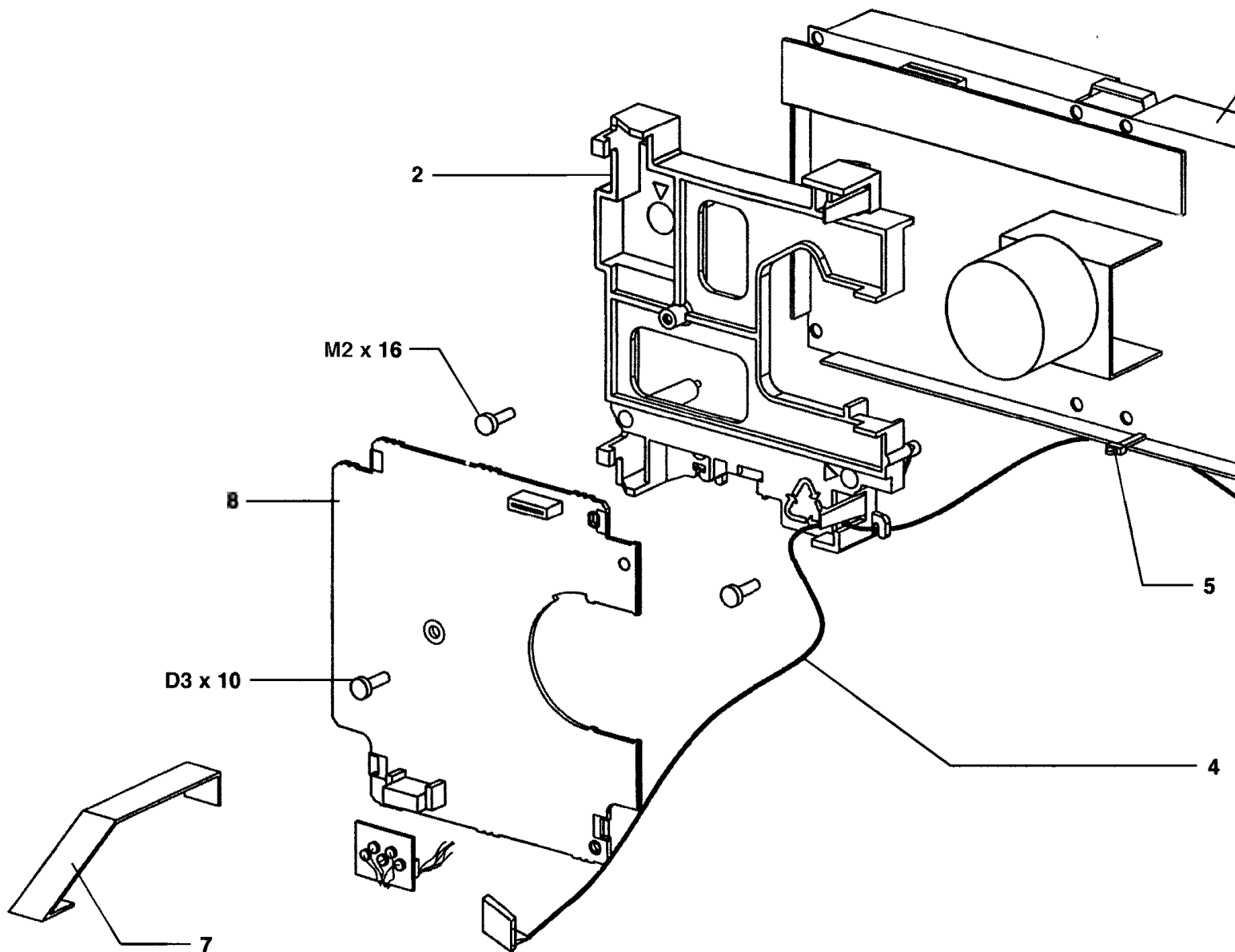
## SERVO CONTROL CIRCUIT

1703 B1	1770 B7	2623 D2	3501 B2	3604 C2	3607 C6	3610 D6	3613 B2	3618 A4	3623 A3	3626 B6	3672 B4	367
1706 E1	2621 D2	2624 E2	3602 C2	3605 B3	3608 D6	3611 C6	3614 B6	3620 A4	3624 B6	3628 A5	3674 A5	367
1760 B8	2622 D2	2625 E4	3603 B2	3606 C3	3609 C6	3612 D6	3616 A5	3622 A4	3625 B3	3630 A6	3676 B5	368



9 B5	3685 C2	3688 A5	4784 A1	6611 A2	7610 D4	7614 A6	7619 B4	7623 C2
9 B3	3686 E6	3689 E3	4785 D2	6612 B6	7612 A6	7616 A4	7620 B6	7624 D6
0 B5	3687 D2	4781 A5	4795 E3	6614 B4	7613 A3	7618 B6	7622 B5	

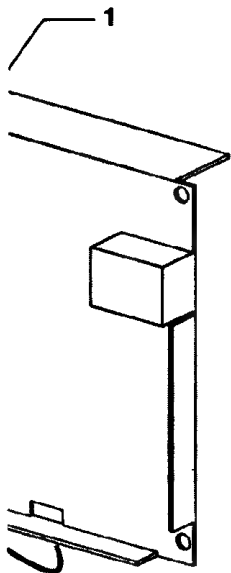




### **ETF6 TAPE MODULE EXPLODED VIEW**

- |   |                |                                 |
|---|----------------|---------------------------------|
| 1 | 4822 691 10673 | Autoreverse Mech. CWC44FR02     |
| 1 | 4822 691 10672 | Non-Autoreverse Mech. CWC44FF01 |
| 7 | 4822 320 12245 | Flex Cable 13 pin 7,5 cm        |

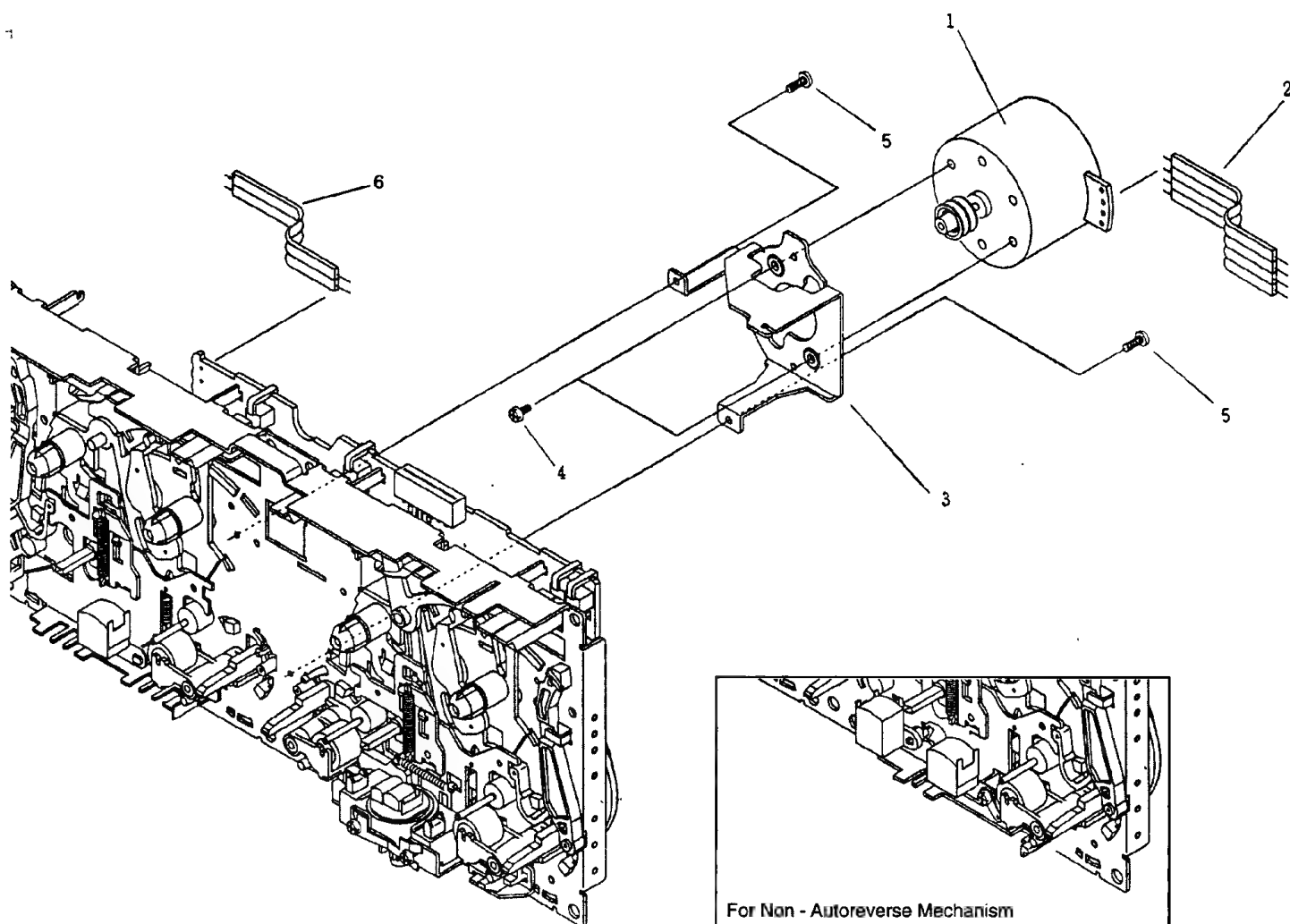
Note: Only the parts mentioned in this list are normal service spare parts.



### **TAPE MECHANISM - MOTOR EXPLODED VIEW**

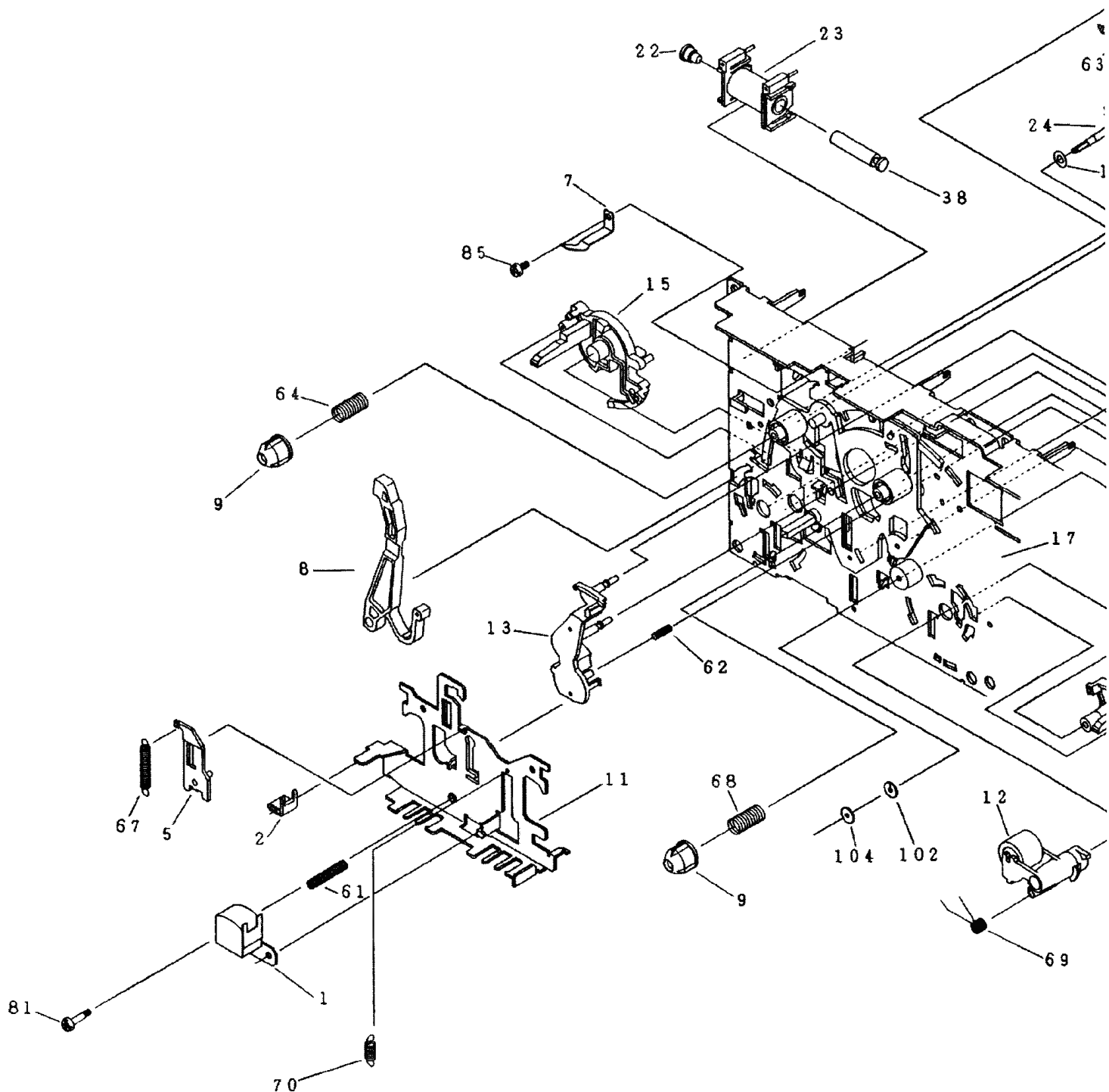
1	4822 361 11055	Motor Assembly
4	-	Screw M2,6 x 4
5	-	Screw M2 x 3

Note: Only the parts mentioned in this list are normal service spare parts.



For Non - Autoreverse Mechanism

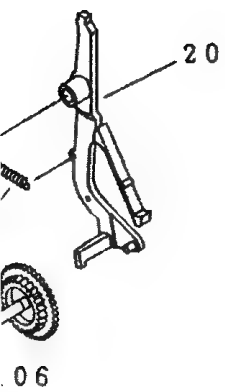
## TAPE MECHANISM A - PLAY

**MECHANICAL PARTS - PLAY MECHANISM**

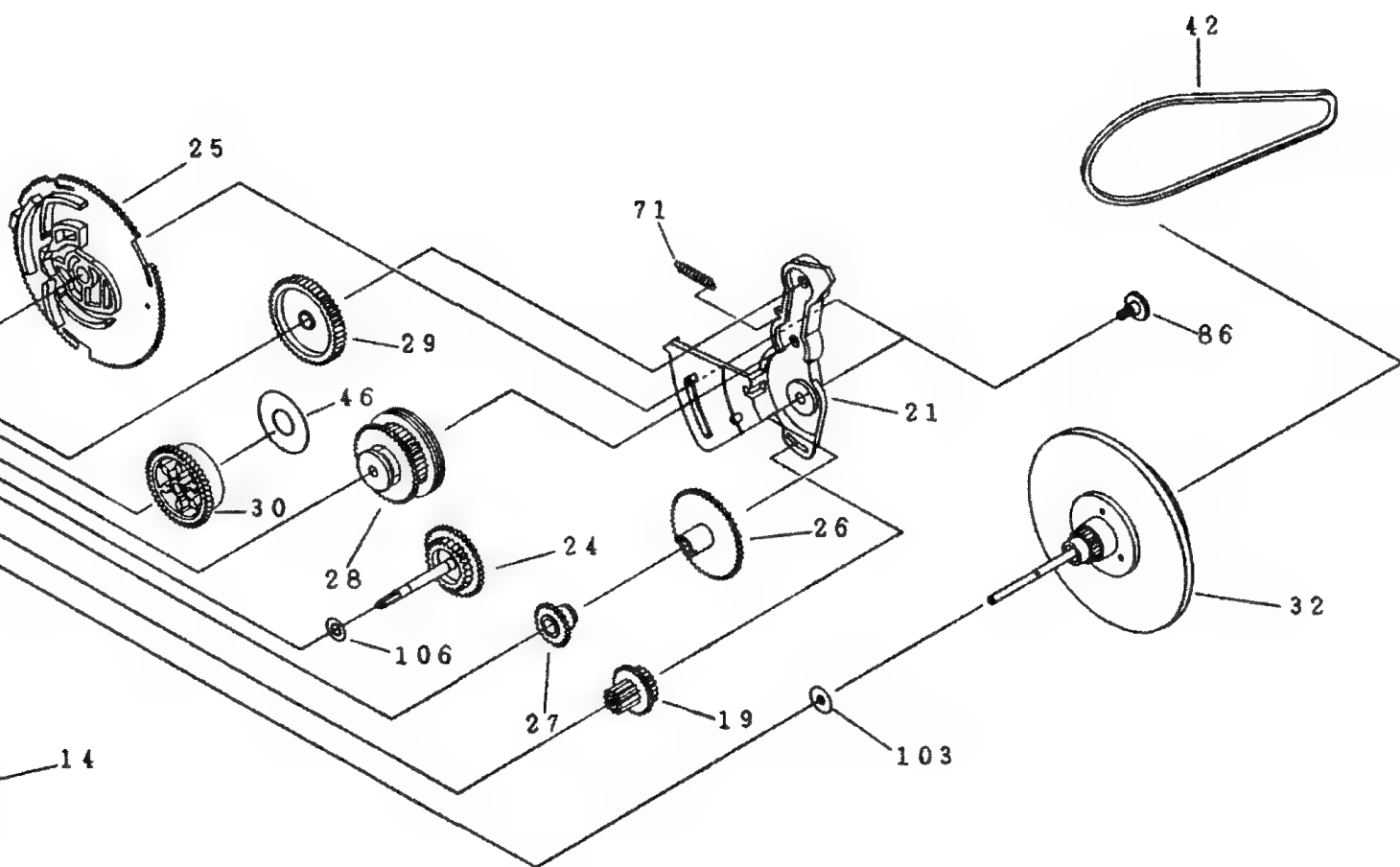
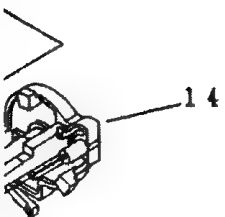
1	4822 249 10397	MS15RAA2N1
12	4822 402 10972	Pinch Arm Assembly Right
23	4822 157 11498	Coil Assembly
32	4822 528 11244	Flywheel Assembly RV
42	4822 358 10168	Belt AF

69	4822 492 11542	Spring
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer

Note: Only the parts mentioned in this list are normal service spare parts.



06



# TAPE MECHANISM B - RECORD/PLAYBACK

(Autoreverse Version)

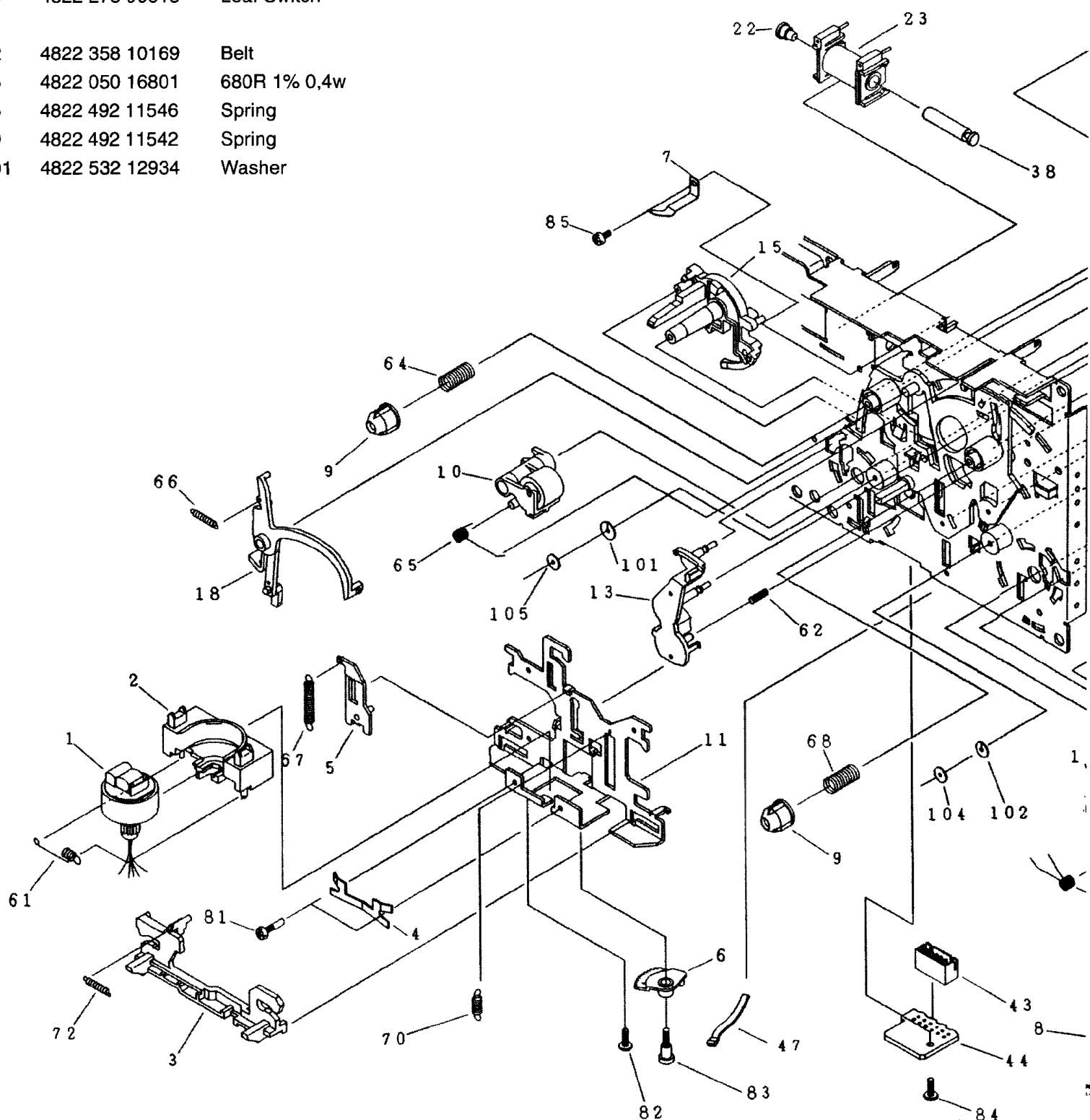
## MECHANICAL PARTS - PLAY MECHANISM

1	4822 249 10552	Rec/Pb Head Assembly
10	4822 402 10973	Pinch Arm Assembly Left
12	4822 402 10972	Pinch Arm Assembly Right
23	4822 157 11498	Coil Assembly
31	4822 528 11211	Flywheel Assembly LV
32	4822 528 11244	Flywheel Assembly RV
33	4822 267 10756	Connector Socket 13pin
34	4822 130 10205	Photo Sensor
35	4822 277 11531	Mode Switch MSW-1722NCV
39	4822 278 90613	Leaf Switch

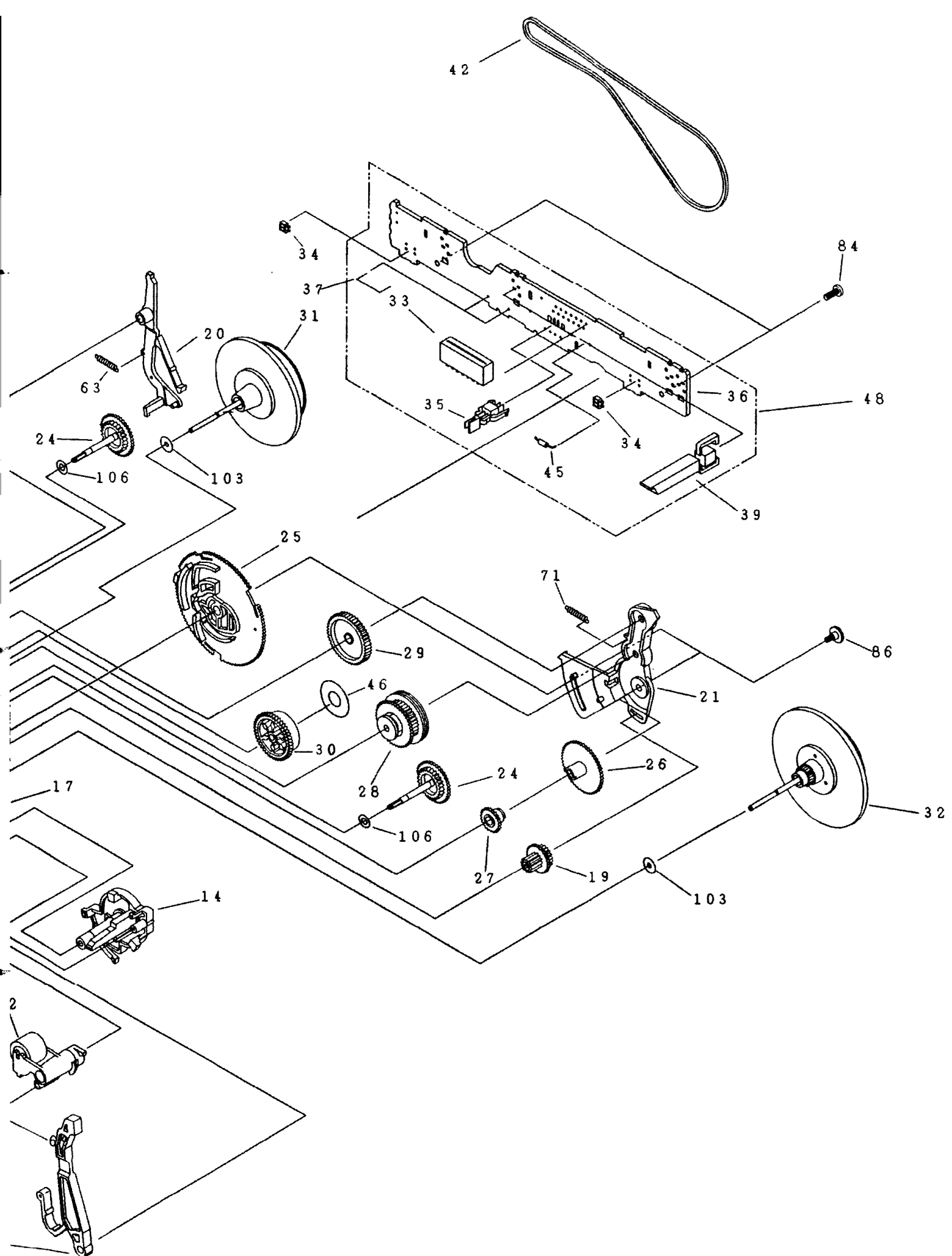
42	4822 358 10169	Belt
45	4822 050 16801	680R 1% 0,4w
65	4822 492 11546	Spring
69	4822 492 11542	Spring
101	4822 532 12934	Washer

102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer
105	4822 532 12935	Washer

Note: Only the parts mentioned in this list are normal service spare parts.







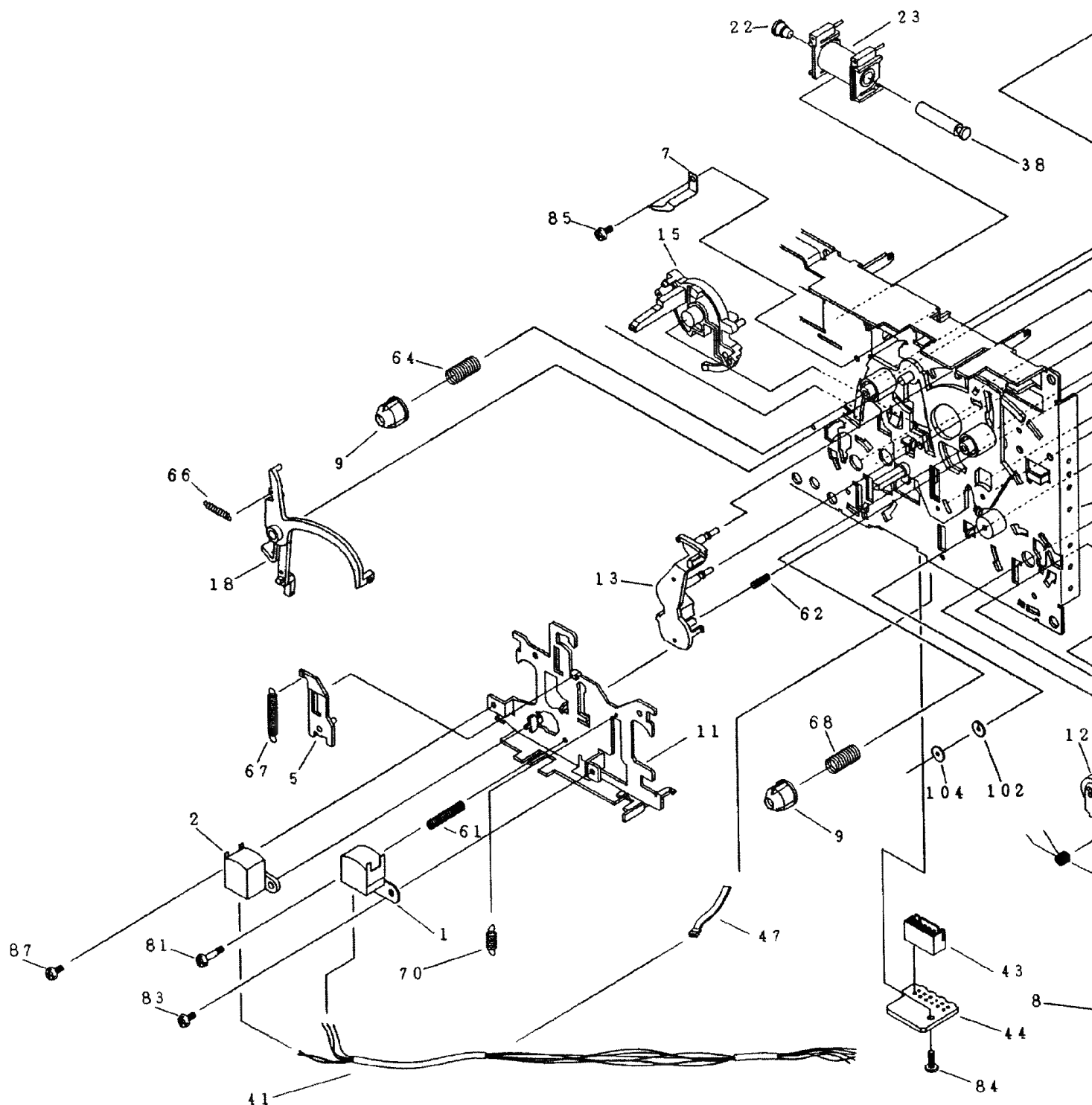
# TAPE MECHANISM B - RECORD/PLAYBACK

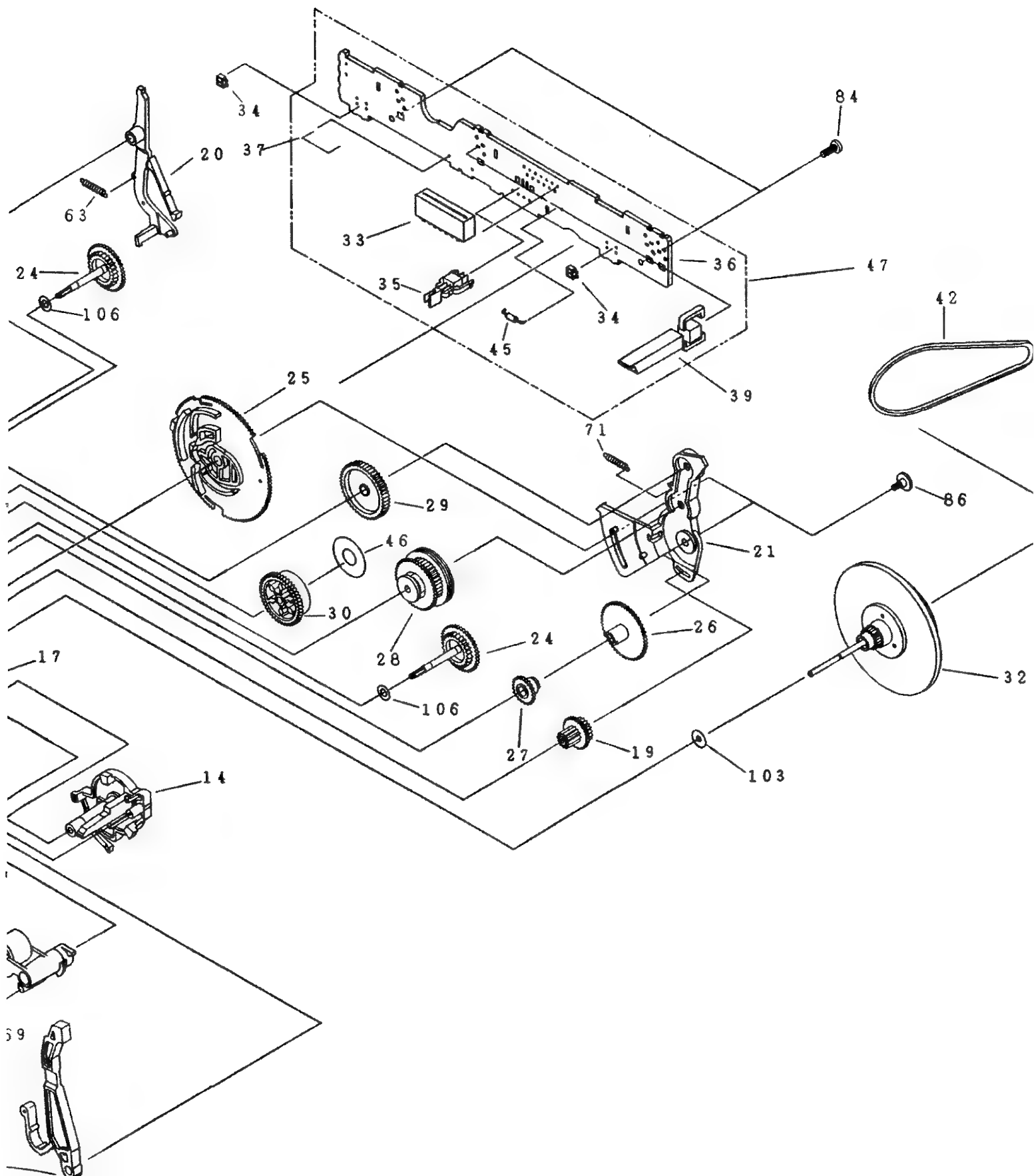
(Non-Autoreverse Version)

## MECHANICAL PARTS - PLAY MECHANISM

1	4822 249 10397	Rec/Pb Head Assembly	45	4822 050 16801	680R 1% 0,4w
2	4822 249 40303	Erase Head	69	4822 492 11542	Spring
12	4822 402 10972	Pinch Arm Assembly Right	102	4822 532 12931	Washer
23	4822 157 11498	Coil Assembly	103	4822 532 12932	Washer
32	4822 528 11244	Flywheel Assembly RV	104	4822 532 12933	Washer
33	4822 267 10756	Connector Socket 13pin			
34	4822 130 10205	Photo Sensor			
35	4822 277 11531	Mode Switch MSW-1722NCV			
39	4822 278 90613	Leaf Switch			
42	4822 358 10235	Belt BF			

Note: Only the parts mentioned in this list are normal service spare parts.





**ELECTRICAL PARTS LIST - ETF6-FE NON-DOLBY BOARD****MISCELLANEOUS**

1701	4822 267 10953	Flex Socket 7P Vert.
1706	4822 267 10953	Flex Socket 7P Vert.
1770	4822 267 10738	Flex Socket 13P Vert.

**CAPACITORS**

2621	5322 122 34123	1nF 10% 50V
2622	5322 122 34099	470pF 10% 63V
2623	5322 122 34099	470pF 10% 63V
2624	4822 126 13196	100nF 10% 25V
2625	4822 126 13196	100nF 10% 25V
2701	5322 122 33538	150pF 2% 63V
2702	5322 122 33538	150pF 2% 63V
2703	5322 122 32531	100pF 5% 50V
2704	5322 122 32531	100pF 5% 50V
2705	4822 122 33575	220pF 5% 50V
2706	4822 122 33575	220pF 5% 50V
2707	5322 122 34099	470pF 10% 63V
2708	5322 122 34099	470pF 10% 63V
2709	5322 122 31863	330pF 5% 50V
2710	5322 122 31863	330pF 5% 50V
2711	5322 122 32531	100pF 5% 50V
2712	5322 122 32531	100pF 5% 50V
2713	4822 124 41579	10μF 20% 50V
2714	4822 124 41579	10μF 20% 50V
2715	4822 124 40196	220μF 20% 16V
2716	4822 124 40196	220μF 20% 16V
2717	4822 122 33177	10nF 20% 50V
2718	4822 122 33177	10nF 20% 50V
2719	4822 126 12105	33nF 5% 63V
2720	4822 126 12105	33nF 5% 63V
2721	5322 122 31866	6,8nF 10% 63V
2722	5322 122 31866	6,8nF 10% 63V
2723	4822 126 13188	15nF 5% 63V
2724	4822 126 13188	15nF 5% 63V
2725	5322 126 10223	4,7nF 10% 63V
2726	5322 126 10223	4,7nF 10% 63V
2727	5322 122 34123	1nF 10% 50V
2728	5322 122 34123	1nF 10% 50V
2729	4822 122 32541	27nF 10% 63V
2730	4822 122 32541	27nF 10% 63V
2733	5322 122 34099	470pF 10% 63V
2734	5322 122 34099	470pF 10% 63V
2735	4822 126 13196	100nF 10% 25V
2737	4822 126 13196	100nF 10% 25V
2738	4822 126 13196	100nF 10% 25V
2741	4822 126 11585	22nF +80/-20% 25V
2742	5322 122 32654	22nF 10% 63V
2743	5322 122 32654	22nF 10% 63V
2744	4822 126 13196	100nF 10% 25V
2760	4822 126 13196	100nF 10% 25V
2761	4822 124 22263	220μF 20% 25V
2762	4822 124 40246	4,7μF 20% 63V

2763	4822 124 40433	47μF 20% 25V
2765	4822 124 40433	47μF 20% 25V
2769	5322 122 34099	470pF 10% 63V
2770	5322 122 34099	470pF 10% 63V
2780	4822 124 81151	22μF 50V
2781	4822 122 33177	10nF 20% 50V
2782	5322 126 10223	4,7nF 10% 63V
2784	4822 121 51305	15nF 10% 50V
2785	4822 124 40242	1μF 20% 63V
2786	5322 122 32531	100pF 5% 50V
2787	4822 126 12105	33nF 5% 63V

**RESISTORS**

3601	4822 117 11449	2k2 1% 0,1W
3602	4822 051 20273	27k 5% 0,1W
3603	4822 117 11449	2k2 1% 0,1W
3604	4822 117 11148	56k 1% 0,1W
3605	4822 117 11449	2k2 1% 0,1W
3606	4822 051 20124	120k 5% 0,1W
3607	4822 116 52256	2k2 5% 0,5W
3608	4822 051 20273	27k 5% 0,1W
3609	4822 116 52256	2k2 5% 0,5W
3610	4822 051 20124	120k 5% 0,1W
3611	4822 116 52256	2k2 5% 0,5W
3612	4822 117 11148	56k 1% 0,1W
3613	4822 051 20273	27k 5% 0,1W
3614	4822 051 20273	27k 5% 0,1W
3616	4822 117 10833	10k 1% 0,1W
3618	4822 117 10833	10k 1% 0,1W
3620	5322 100 11542	Trimmer 4k7 30% 0,1W
3623	4822 051 20104	100k 5% 0,1W
3624	4822 051 20104	100k 5% 0,1W
3625	4822 051 10102	1k 2% 0,25W
3626	4822 051 10102	1k 2% 0,25W
3628	4822 051 20104	100k 5% 0,1W
3630	4822 051 20471	470R 5% 0,1W
3672	4822 051 20472	4k7 5% 0,1W
3674	4822 116 52283	4k7 5% 0,5W
3676	4822 117 10834	47k 1% 0,1W
3678	4822 117 10834	47k 1% 0,1W
3679	4822 117 10834	47k 1% 0,1W
3680	4822 117 10834	47k 1% 0,1W
3685	4822 116 52234	100k 5% 0,5W
3686	4822 051 20104	100k 5% 0,1W
3701	4822 117 11503	220R 1% 0,1W
3702	4822 117 11503	220R 1% 0,1W
3703	4822 117 11503	220R 1% 0,1W
3704	4822 117 11503	220R 1% 0,1W
3705	4822 117 11503	220R 1% 0,1W
3706	4822 117 11503	220R 1% 0,1W
3707	4822 051 20101	100R 5% 0,1W
3708	4822 051 20101	100R 5% 0,1W

**ELECTRICAL PARTS LIST - ETF6-FE NON-DOLBY BOARD**

3709	4822 051 20688	6R8 5% 0,1W	3763	4822 051 20154	150k 5% 0,1W
3710	4822 051 20688	6R8 5% 0,1W	3764	4822 116 83872	220R 5% 0,5W
3711	4822 051 20154	150k 5% 0,1W	3765	4822 051 20393	39k 5% 0,1W
3712	4822 051 20154	150k 5% 0,1W	3766	4822 051 20475	4M7 5% 0,1W
3713	4822 051 20109	10R 5% 0,1W	3767	4822 051 20475	4M7 5% 0,1W
3714	4822 051 20109	10R 5% 0,1W	3768	4822 117 10833	10k 1% 0,1W
3715	4822 051 20182	1k8 5% 0,1W	3769	4822 117 11383	12k 1% 0,1W <i>Autoreverse</i>
3716	4822 051 20182	1k8 5% 0,1W	3769	4822 051 20822	8k2 5% 0,1W <i>Non-Autoreverse</i>
3717	4822 117 11449	2k2 1% 0,1W	3770	4822 117 11139	1k5 1% 0,1W
3718	4822 117 11449	2k2 1% 0,1W	3771	4822 051 20122	1k2 5% 0,1W
3719	4822 051 20472	4k7 5% 0,1W	3772	4822 051 20472	4k7 5% 0,1W <i>Autoreverse</i>
3720	4822 051 20472	4k7 5% 0,1W	3772	4822 051 20562	5k6 5% 0,1W <i>Non-Autoreverse</i>
3721	4822 051 20562	5k6 5% 0,1W	3773	5322 100 11542	Trimmer 4k7 30% 0,1W
3722	4822 051 20562	5k6 5% 0,1W	3774	4822 117 10833	10k 1% 0,1W <i>Autoreverse</i>
3723	4822 117 11383	12k 1% 0,1W <i>Autoreverse</i>	3774	4822 051 20822	8k2 5% 0,1W <i>Non-Autoreverse</i>
3723	4822 051 20153	15k 5% 0,1W <i>Non-Autoreverse</i>	3775	4822 051 20478	4R7 5% 0,1W
3724	4822 117 11383	12k 1% 0,1W <i>Autoreverse</i>	3776	4822 117 11507	6k8 1% 0,1W
3724	4822 051 20153	15k 5% 0,1W <i>Non-Autoreverse</i>	3777	4822 117 10353	150R 1% 0,1W
3725	4822 051 20109	10R 5% 0,1W	3778	4822 052 10688	△ 6R8 5% 0,33W
3726	4822 051 20109	10R 5% 0,1W	3779	4822 051 20334	330k 5% 0,1W
3727	4822 051 20562	5k6 5% 0,1W	3780	4822 051 20105	1M 5% 0,1W
3728	4822 051 20562	5k6 5% 0,1W	3781	4822 051 20475	4M7 5% 0,1W
3729	4822 117 12955	2k7 1% 0,1W	3784	4822 051 10102	1k 2% 0,25W
3730	4822 117 12955	2k7 1% 0,1W	3786	4822 051 20223	22k 5% 0,1W
3731	4822 117 11507	6k8 1% 0,1W	3787	4822 051 20105	1M 5% 0,1W
3732	4822 117 11507	6k8 1% 0,1W	3788	4822 051 20105	1M 5% 0,1W
3733	4822 051 10102	1k 2% 0,25W	3789	4822 117 10834	47k 1% 0,1W
3734	4822 051 10102	1k 2% 0,25W	4701	4822 051 20008	0R Jumper 0805
3735	4822 051 20223	22k 5% 0,1W	4702	4822 051 20008	0R Jumper 0805
3736	4822 051 20223	22k 5% 0,1W	4703	4822 051 20008	0R Jumper 0805
3741	4822 117 11449	2k2 1% 0,1W	4704	4822 051 20008	0R Jumper 0805
3742	4822 117 11449	2k2 1% 0,1W	4705	4822 051 20008	0R Jumper 0805
3743	4822 051 20122	1k2 5% 0,1W <i>Autoreverse</i>	4706	4822 051 20008	0R Jumper 0805
3743	4822 051 10102	1k2 5% 0,25W <i>Non-Autoreverse</i>	4707	4822 051 20008	0R Jumper 0805
3744	4822 051 20122	1k2 5% 0,1W <i>Autoreverse</i>	4708	4822 051 20008	0R Jumper 0805
3744	4822 051 10102	1k2 5% 0,25W <i>Non-Autoreverse</i>	4709	4822 051 20008	0R Jumper 0805
3745	4822 051 20332	3k3 5% 0,1W	4710	4822 051 20008	0R Jumper 0805
3746	4822 051 20332	3k3 5% 0,1W	4711	4822 051 20008	0R Jumper 0805
3748	4822 117 11449	2k2 1% 0,1W	4712	4822 051 20008	0R Jumper 0805
3749	4822 117 10834	47k 1% 0,1W	4713	4822 051 20008	0R Jumper 0805
3751	4822 117 10833	10k 1% 0,1W	4714	4822 051 20008	0R Jumper 0805
3752	4822 051 20104	100k 5% 0,1W	4715	4822 051 20008	0R Jumper 0805
3753	4822 051 20104	100k 5% 0,1W	4716	4822 051 20008	0R Jumper 0805
3754	4822 051 20105	1M 5% 0,1W	4717	4822 051 20008	0R Jumper 0805
3755	4822 051 20105	1M 5% 0,1W	4718	4822 051 20008	0R Jumper 0805
3756	4822 117 13579	220k 1% 0,1W	4719	4822 051 20008	0R Jumper 0805
3757	4822 117 13579	220k 1% 0,1W	4720	4822 051 20008	0R Jumper 0805
3758	4822 117 10833	10k 1% 0,1W	4721	4822 051 20008	0R Jumper 0805
3759	4822 117 10833	10k 1% 0,1W	4722	4822 051 20008	0R Jumper 0805
3760	4822 051 20121	120R 5% 0,1W	4723	4822 051 20008	0R Jumper 0805
3761	4822 116 83864	10k 5% 0,5W	4724	4822 051 20008	0R Jumper 0805
3762	4822 117 11454	820R 1% 0,1W	4725	4822 051 20008	0R Jumper 0805

**ELECTRICAL PARTS LIST - ETF6-FE NON-DOLBY BOARD****RESISTORS**

4726	4822 051 20008	0R Jumper 0805
4727	4822 051 20008	0R Jumper 0805
4728	4822 051 20008	0R Jumper 0805
4729	4822 051 20008	0R Jumper 0805
4730	4822 051 20008	0R Jumper 0805
4731	4822 051 20008	0R Jumper 0805
4732	4822 051 20008	0R Jumper 0805
4733	4822 051 20008	0R Jumper 0805
4734	4822 051 20008	0R Jumper 0805
4735	4822 051 20008	0R Jumper 0805
4736	4822 051 20008	0R Jumper 0805
4737	4822 051 20008	0R Jumper 0805
4738	4822 051 20008	0R Jumper 0805
4739	4822 051 20008	0R Jumper 0805
4740	4822 051 20008	0R Jumper 0805
4741	4822 051 20008	0R Jumper 0805
4742	4822 051 20008	0R Jumper 0805
4781	4822 051 20681	680R 5% 0,1W
4785	4822 051 20008	0R Jumper 0805
4790	4822 051 20008	0R Jumper 0805
4794	4822 051 20008	0R Jumper 0805
4795	4822 051 20008	0R Jumper 0805

7620	4822 130 60511	BC847B
7622	4822 130 60511	BC847B
7623	4822 130 60511	BC847B
7624	4822 130 60511	BC847B
7710	4822 209 32919	HEF4952BT
7720	4822 209 32918	AN7318S
7730	4822 209 32919	HEF4952BT
7740	4822 209 32919	HEF4952BT
7780	4822 130 60511	BC847B
7781	4822 130 42804	BC817-25
7782	4822 130 44568	BC557B
7783	4822 130 60511	BC847B
7784	5322 130 60508	BC857B
7786	4822 130 63494	J111
7787	4822 130 60511	BC847B
7791	4822 130 60511	BC847B
7792	4822 130 60511	BC847B

Note: Only the parts mentioned in this list are normal service spare parts.

**COILS & FILTERS**

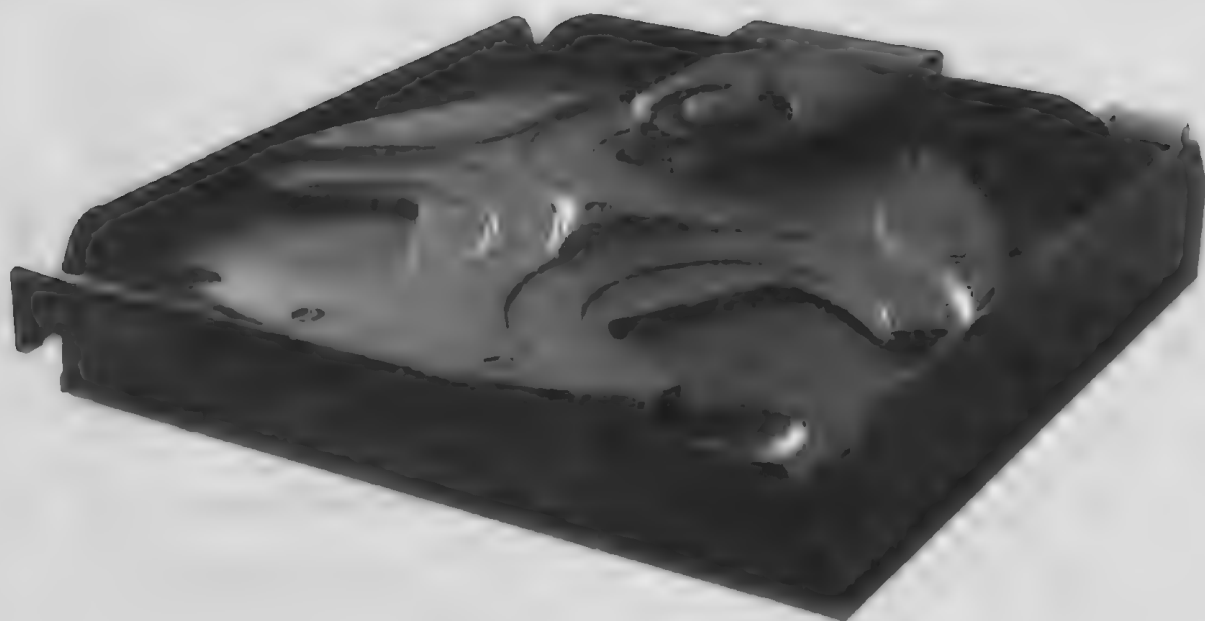
5701	4822 157 11477	Coil 2,2 $\mu$ H 5%
5703	4822 156 20946	Oscillator Coil 100kHz

**DIODES**

6611	4822 130 31878	1N4003G
6612	4822 130 31878	1N4003G
6614	4822 130 30621	1N4148
6770	4822 130 30621	1N4148
6771	4822 130 30621	1N4148
6772	4822 130 30621	1N4148
6773	4822 130 30621	1N4148
6774	4822 130 30621	1N4148
6775	4822 130 30621	1N4148
6776	4822 130 30621	1N4148
6777	4822 130 34382	BZX79-B8V2
6778	4822 130 30621	1N4148
6782	4822 130 30621	1N4148
6785	4822 130 30621	1N4148
6786	4822 130 30621	1N4148

**TRANSISTORS & INTEGRATED CIRCUITS**

7610	5322 209 11306	HEF4094BT
7612	5322 130 60845	BC807-25
7613	5322 130 60845	BC807-25
7614	5322 130 60845	BC807-25
7616	5322 130 60508	BC857B
7618	4822 130 60511	BC847B
7619	4822 130 60511	BC847B



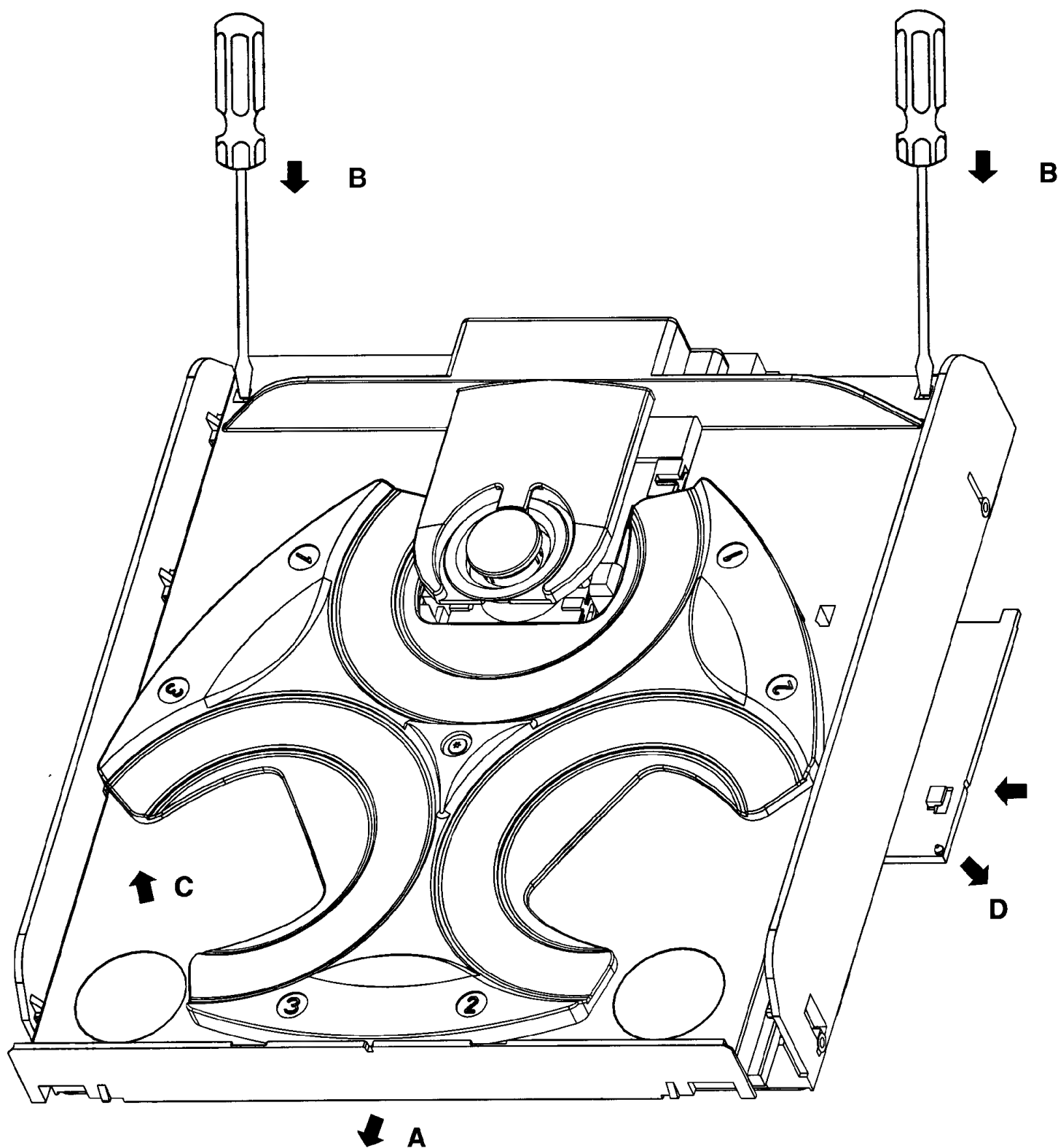
## **3CDC 99 Module**

### **(3 Disc Carrousel Changer)**

#### **TABLE OF CONTENTS**

Demounting Hints .....	10-2
Servicing Hints.....	10-3
Lubrication Instructions.....	10-4
ESD Warnings .....	10-6
Blockdiagram.....	10-7
Wiring .....	10-8
Circuit Diagram part1 .....	10-9
Component Layout .....	10-10
Circuit Diagram part2 .....	10-11
Exploded View.....	10-12
Mechanical Partslist.....	10-13
Electrical Partslist .....	10-15





## Demounting of Drawer

- **A** Pull drawer outwards
- **B** Unlock drawer with screwdriver
- **C** Lift drawer to demount from chassis

## Demounting of Flex Plate

- **D** Lift plate to unlock pin from bottom plate
- **E** Move plate inwards to demount from bottom plate

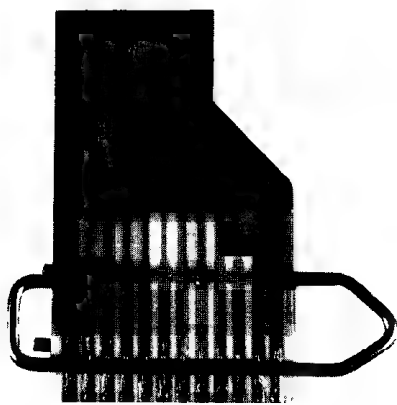


## Servicing Hints

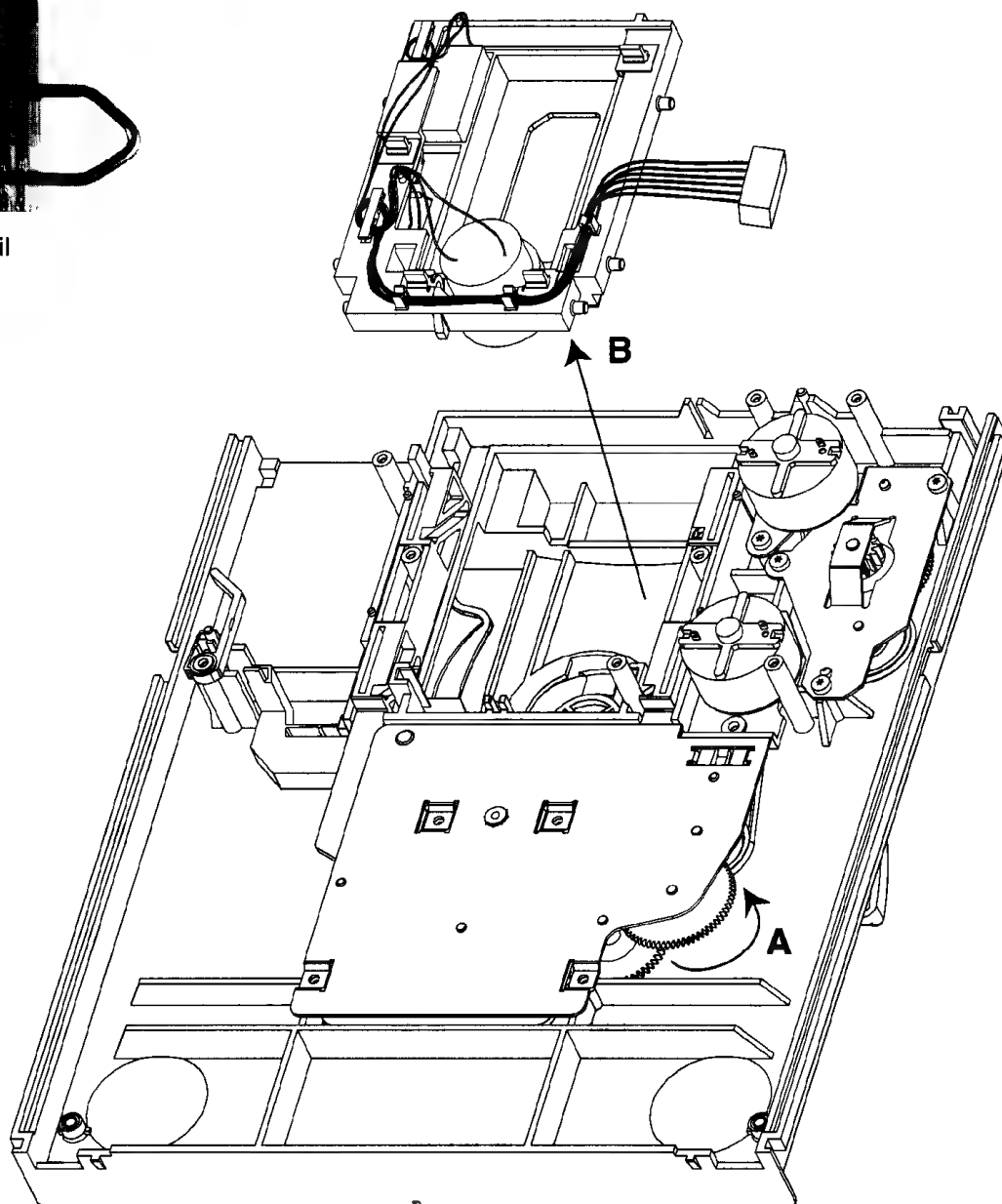
### Replacement of CD Drive

See also exploded view of changer mechanism.

1. Demount printed circuit board: remove 5 screws.
2. Disconnect flexfoil and JST connector of CD drive from Printed circuit board. Shortcircuit the flexfoil with a paperclip to protect the laser against ESD.
3. Remove 2 screws (pos 107,108) and demount CD drive lockings (pos 105,106).
4. Turn gearwheel (pos 42) of disc change mechanism by finger to move CD drive support in upper position as shown in picture below (A).
5. Demount CD drive support (pos 95) (B).
6. Replace CD drive (pos 100). The wire tree of JST connector has to be desoldered and resoldered on the new CD drive again.



CD drive flex foil

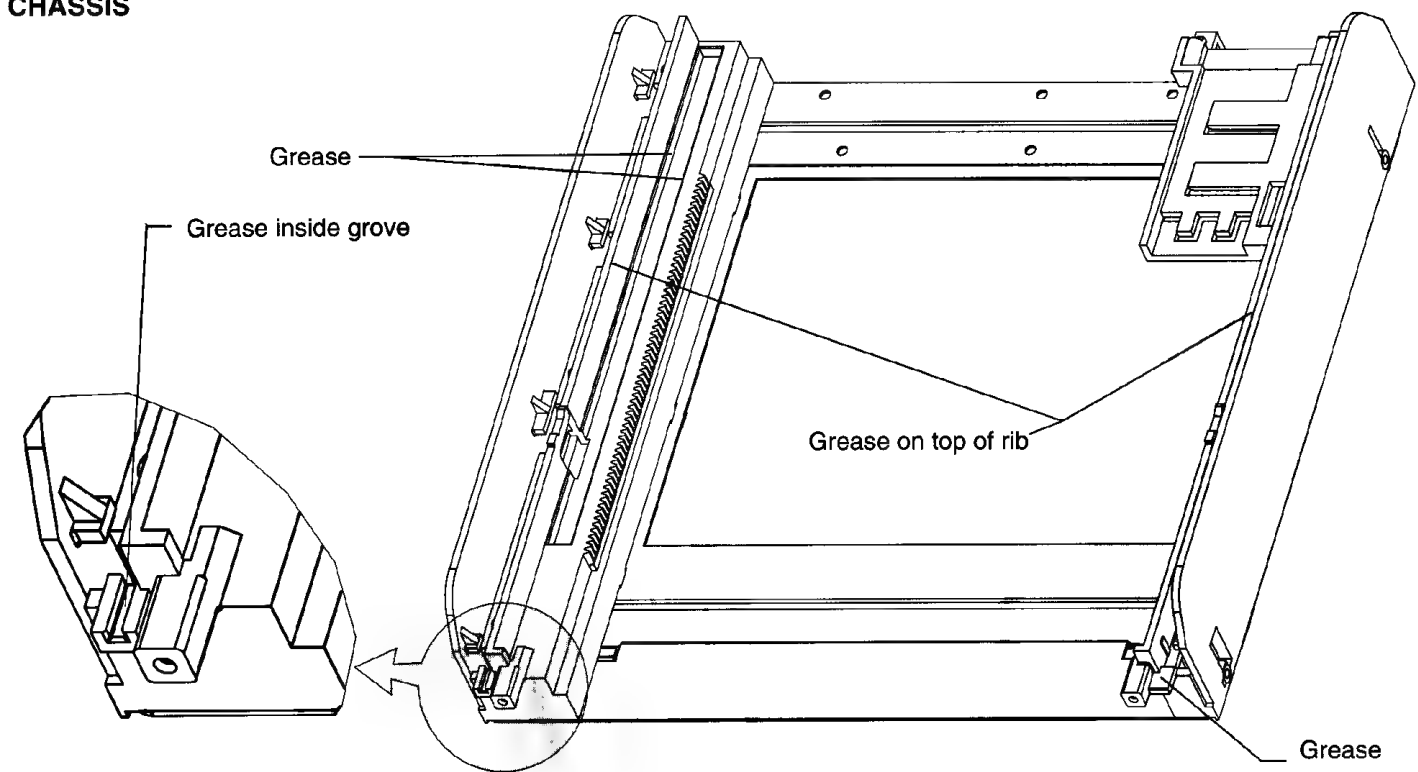


### Mounting of Carrousel

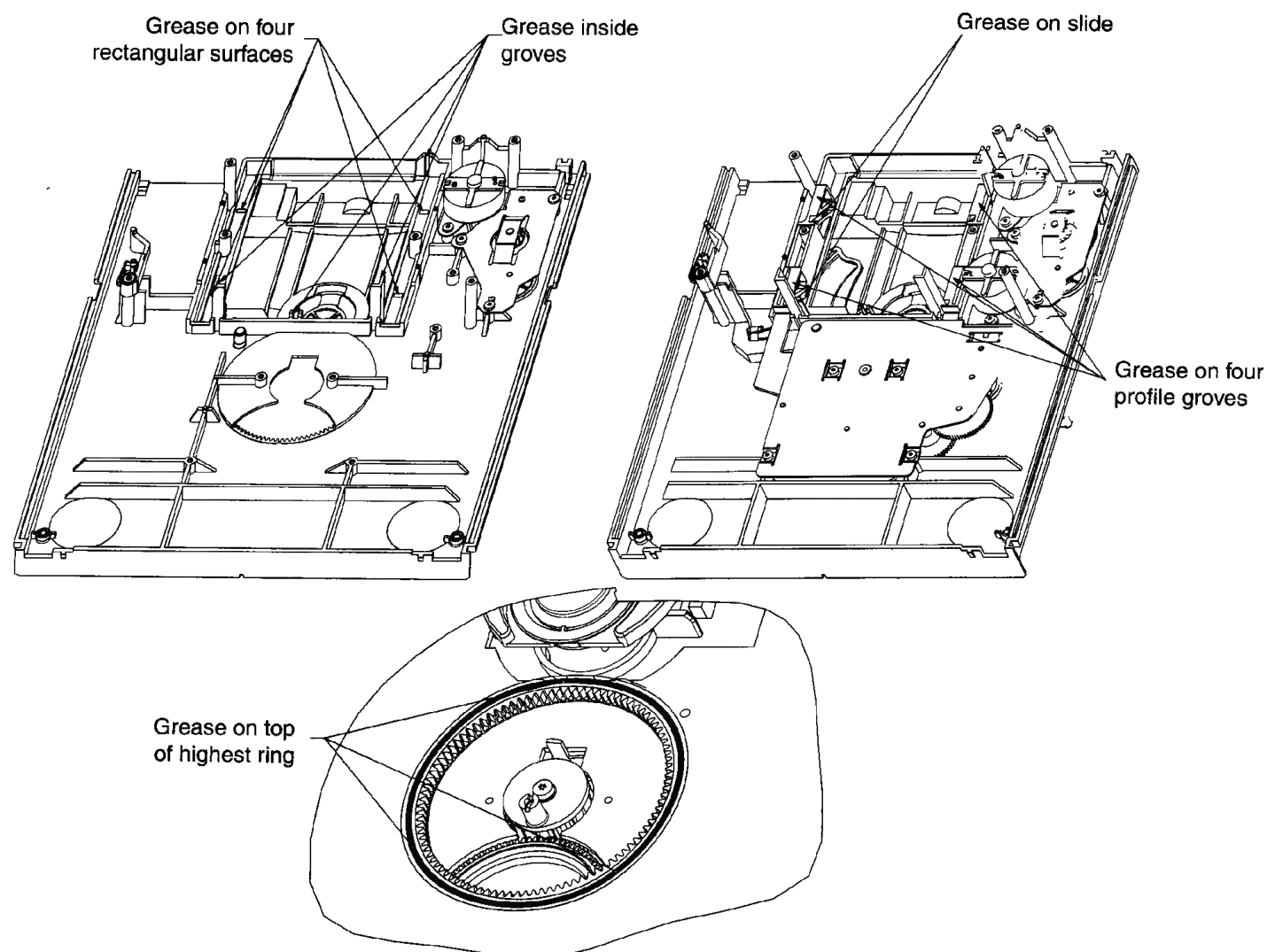
1. Turn gearwheel (pos 42) of disc change mechanism by finger until CD drive is in play position.
2. Mount carrousel (pos 115) so that disc is positioned right on turntable. Carrousel position number doesn't matter.

# Lubrication Instructions

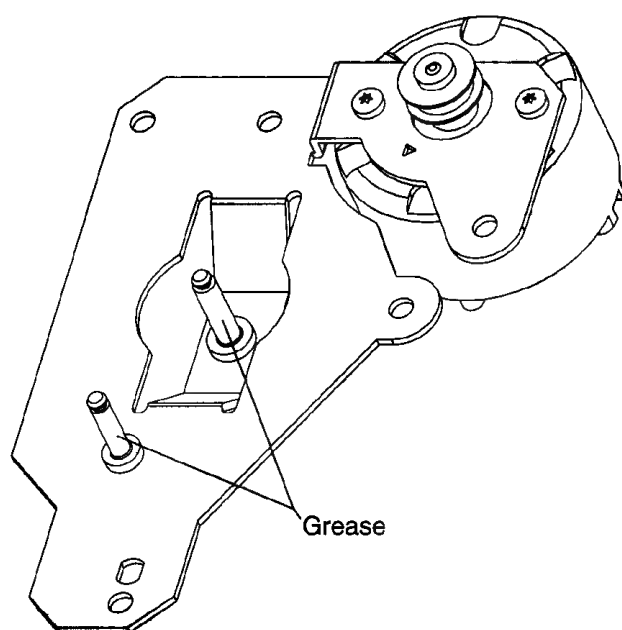
## CHASSIS



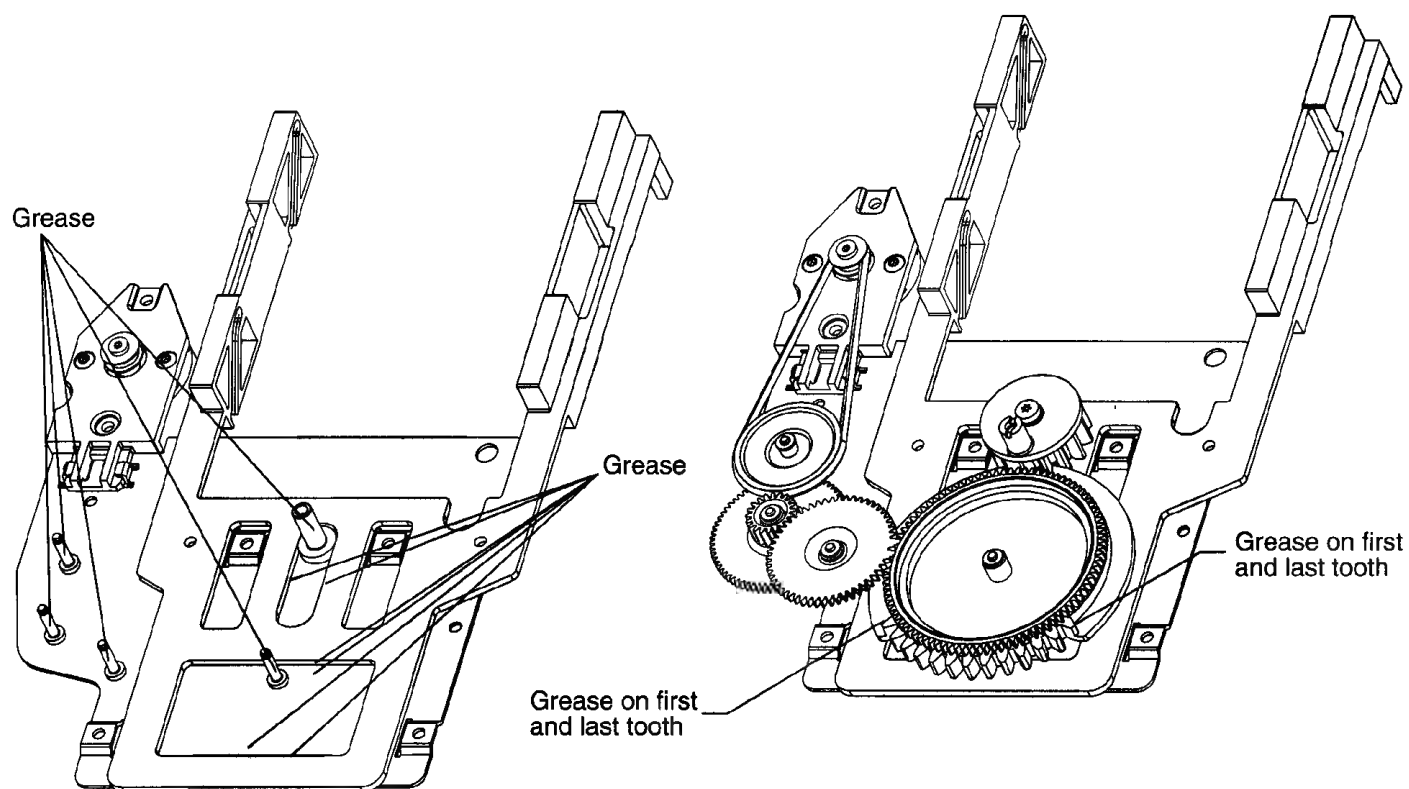
## DRAWER



## DRAWER MECHANISM



## DISC CHANGE MECHANISM



Use only grease **Polylub GLY 801** service codenumber 4822 390 10136

**WARNING**

**CHARGED CAPACITORS ON THE SERVO BOARD MAY DAMAGE THE CD DRIVE ELECTRONICS WHEN CONNECTING A NEW CDM MECHANISM. THAT'S WHY, BESIDES THE SAFETY MEASURES LIKE**

- **SWITCH OFF POWER SUPPLY**
- **ESD PROTECTION**

**ADDITIONAL ACTIONS MUST BE TAKEN BY THE REPAIR TECHNICIAN.**

The following steps have to be done when replacing the CDM mechanism:

- 1 Disconnect old CD drive flexfoil from printed board
- 2 Connect paperclip to CD drive flexfoil to short-circuit flexfoil (fig 1)
- 3 Short-circuit printed board with **brass-sheet (4822 321 11197)** plugged into the flexfoil connector (fig 2)
- 4 Remove old CD drive mechanism
- 5 Position new CD mechanism in its studs
- 6 Remove short-circuit from printed board connector
- 7 Remove short-circuit from flexfoil of new CD drive
- 8 Connect new flexfoil to print connector (fig 3)

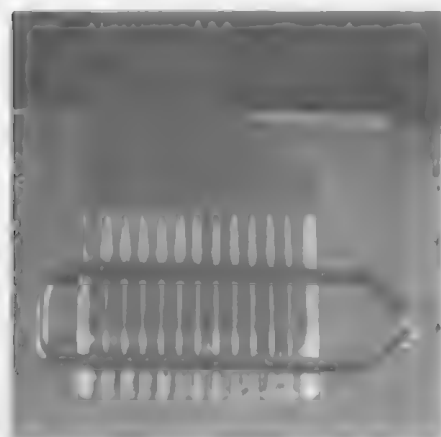


fig. 1

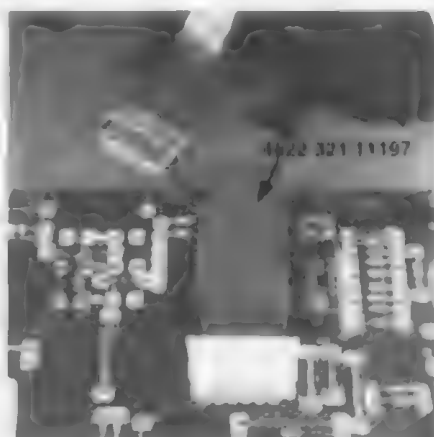


fig. 2

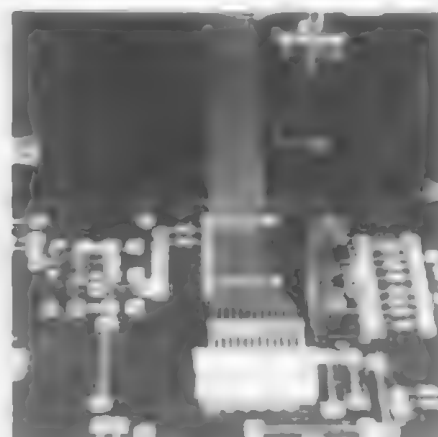
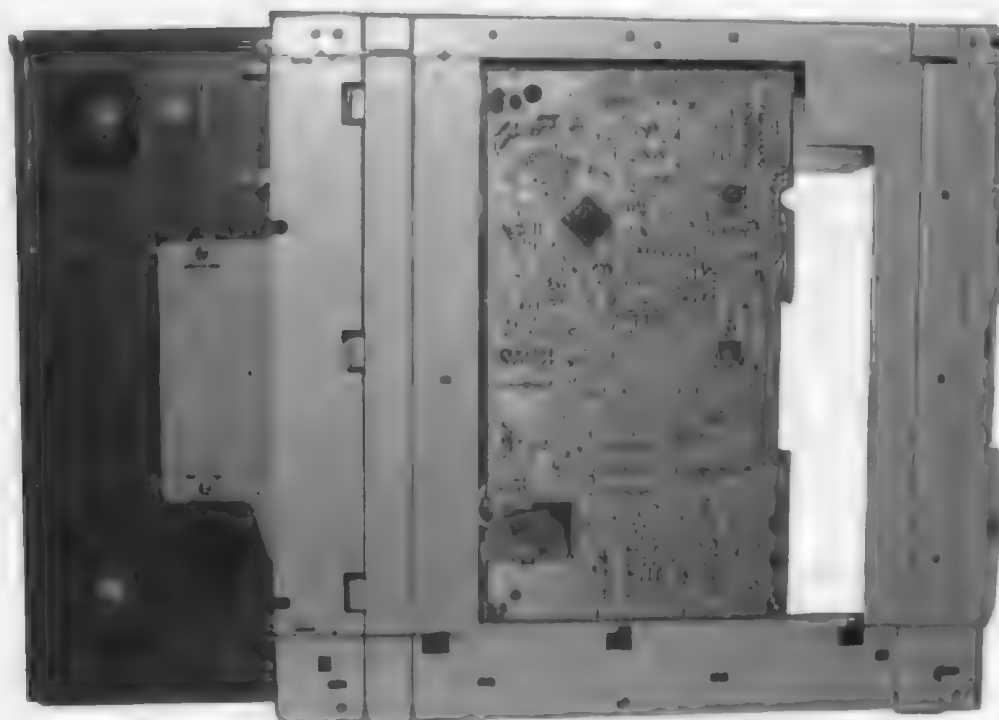
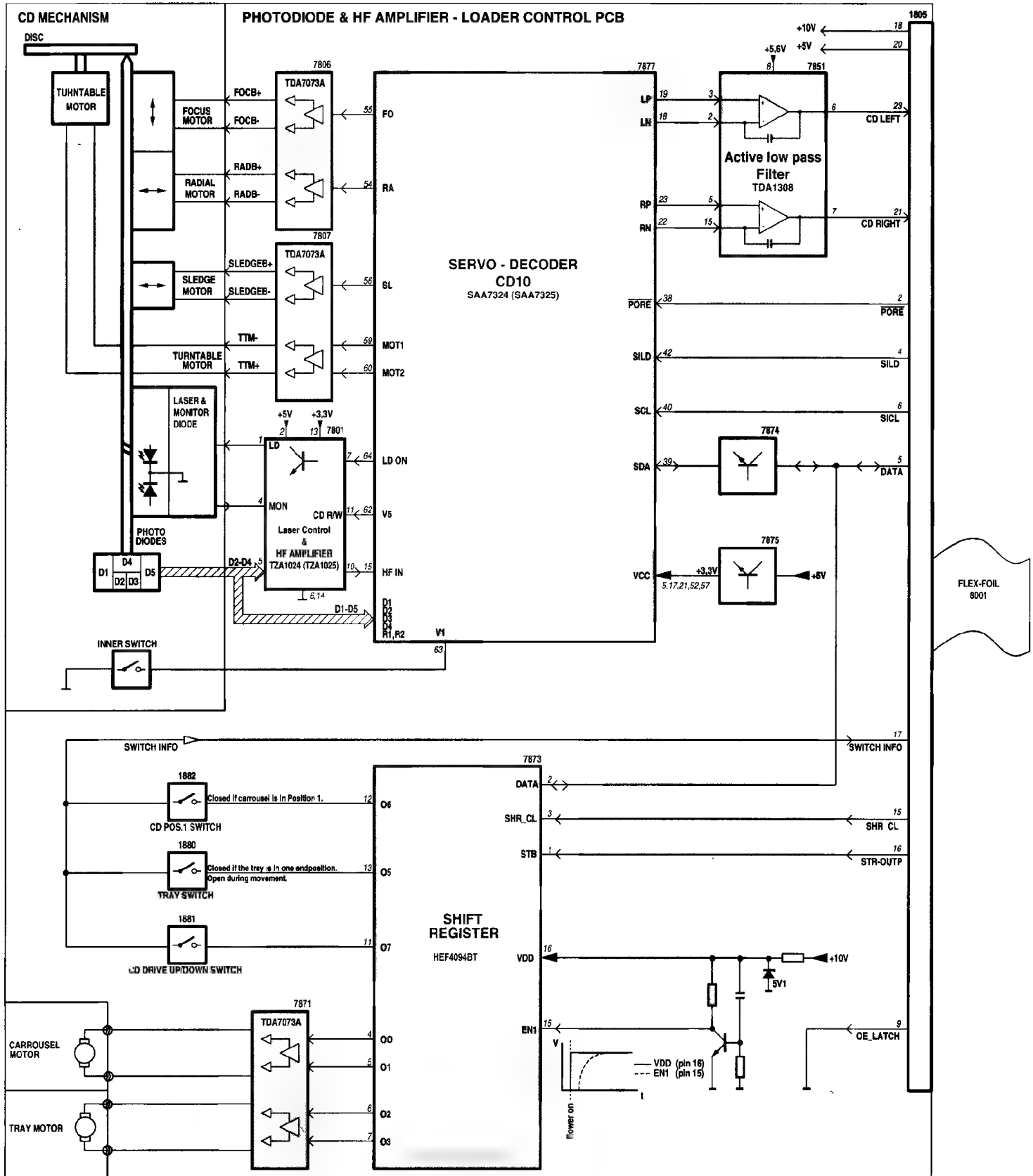


fig. 3

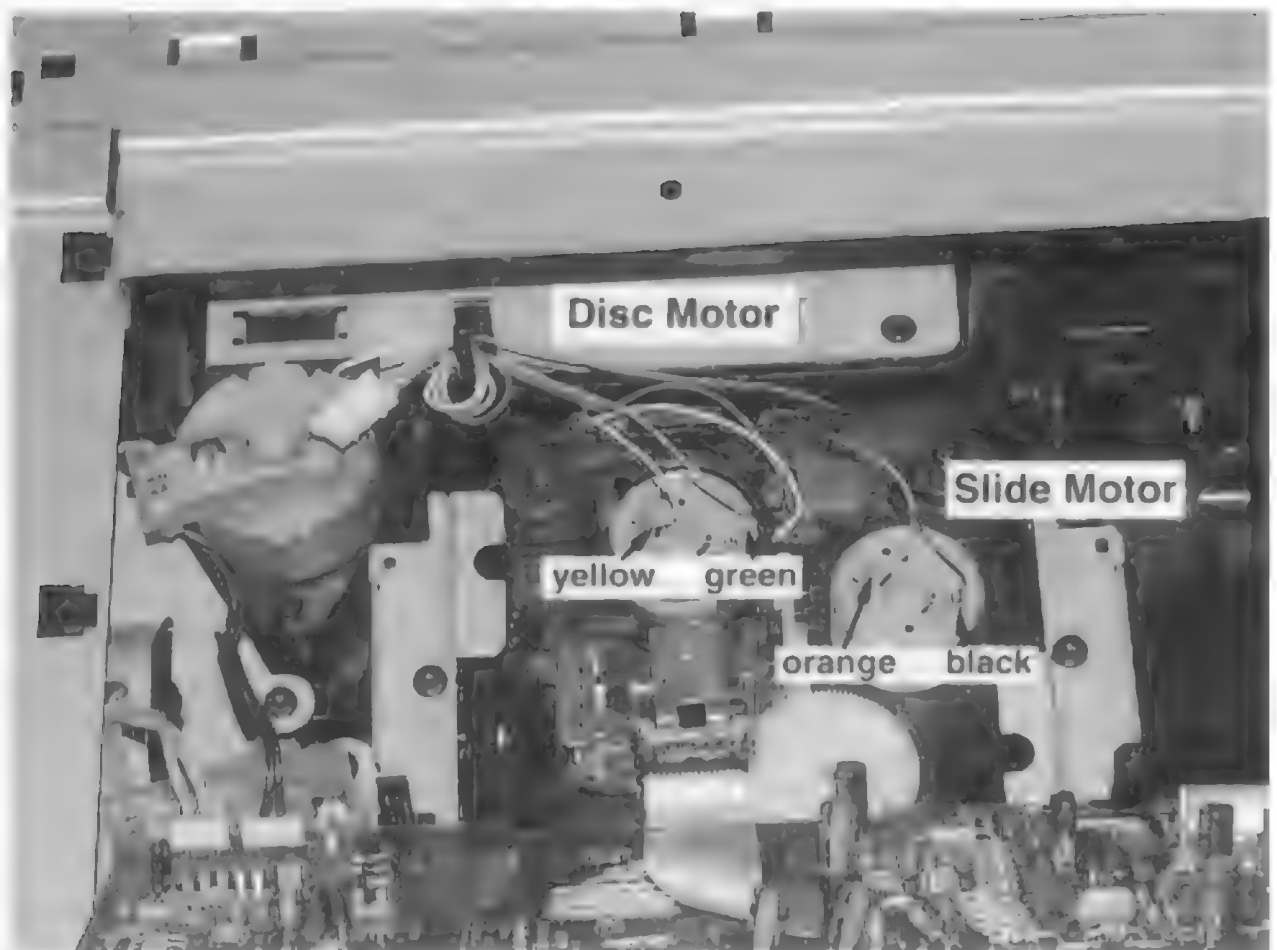
**Service Position**

## Blockdiagram

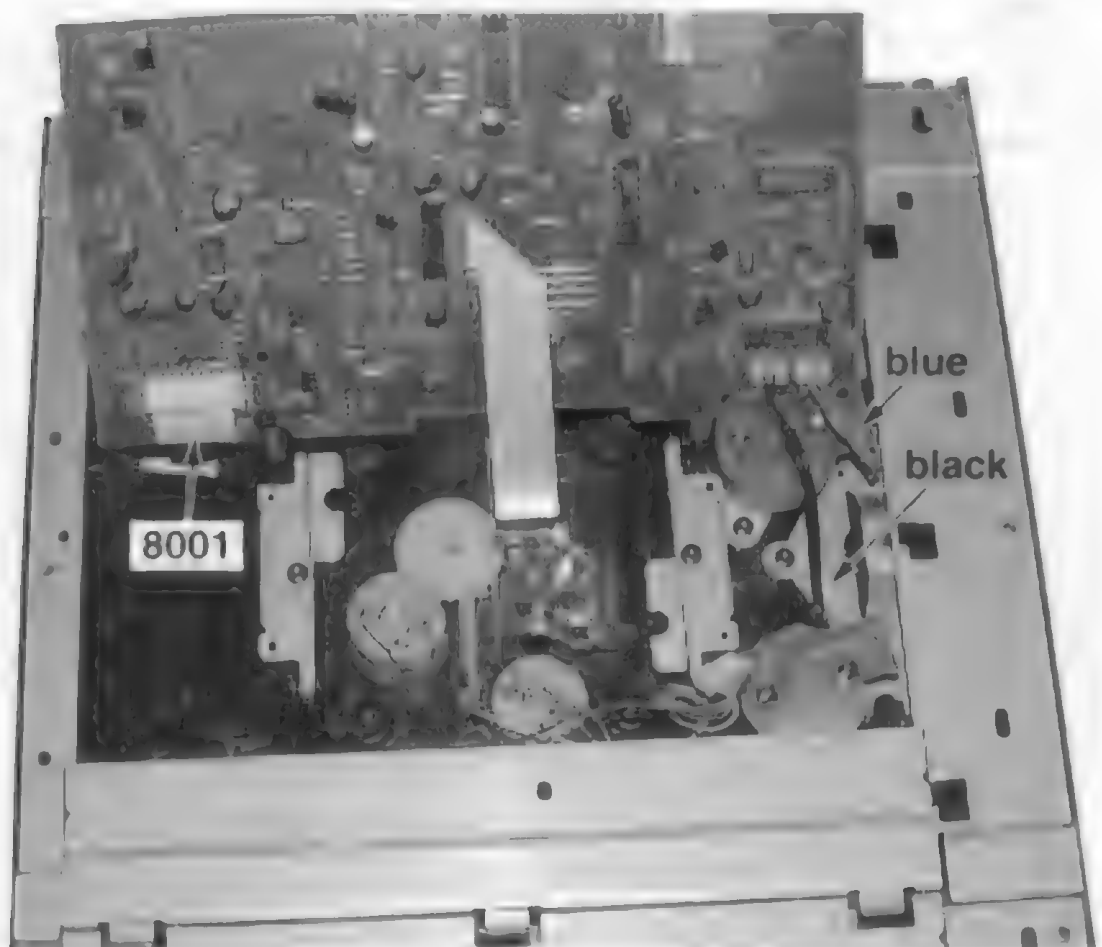


Blockdiagram J00C99 19981202

# Wiring of CD Drive



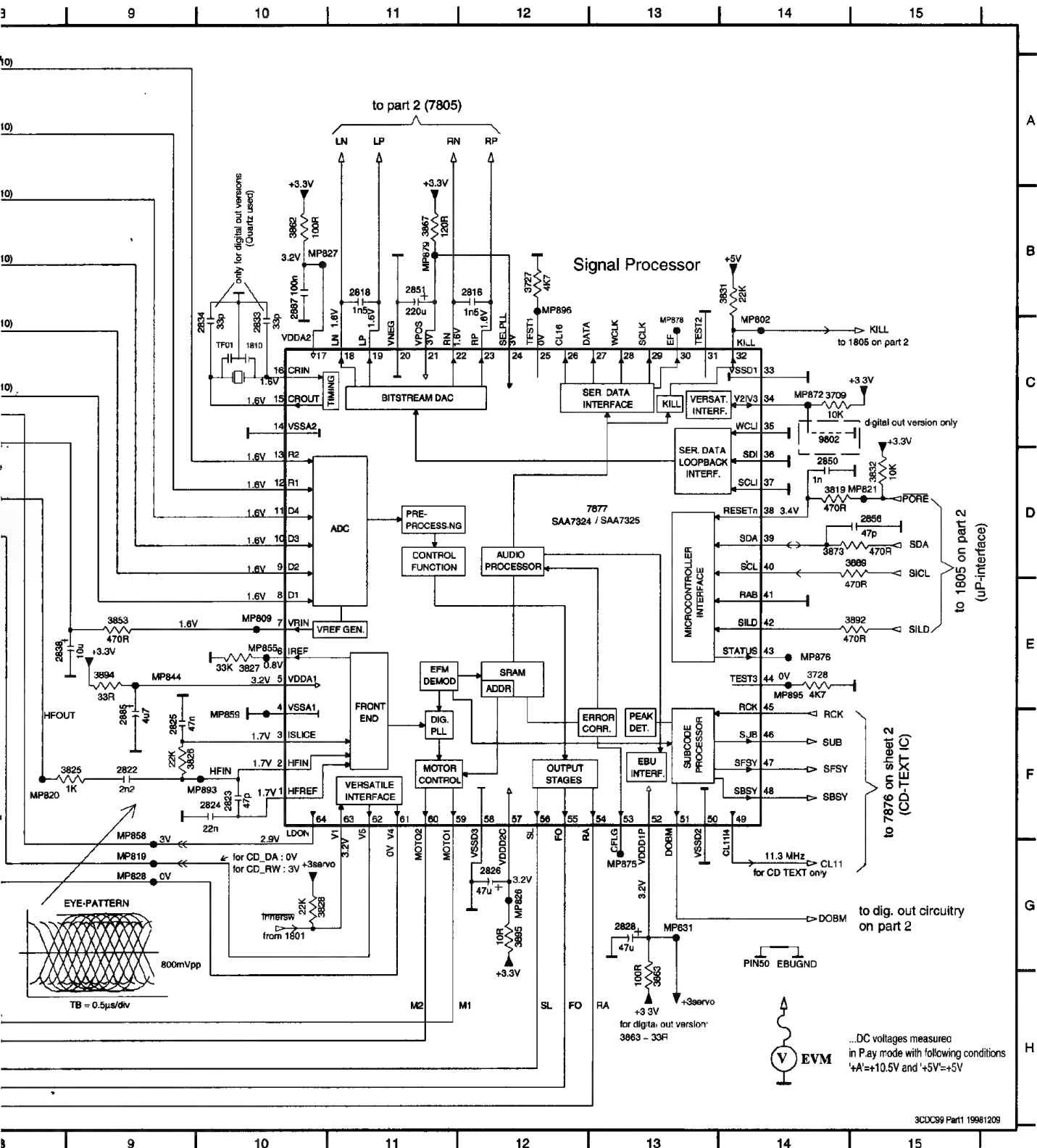
Pict 1



Pict 2



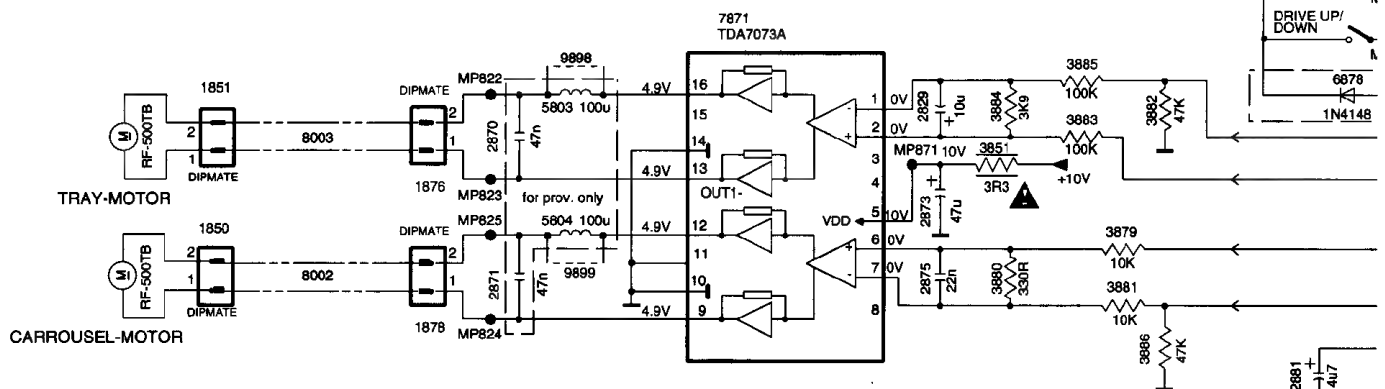
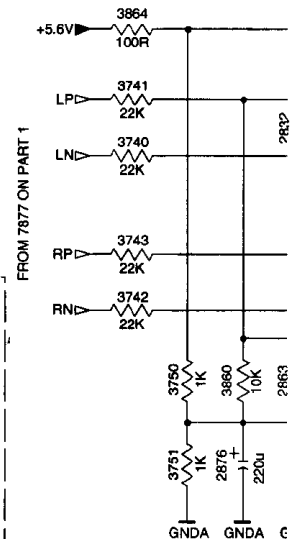
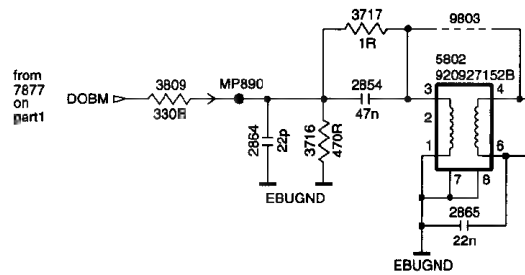
C4	3815 E5	3825 F9	3834 A4	3842 F5	3849 H5	3866 D8	3894 E9	9802 C14
B4	3819 D14	3826 F9	3835 F5	3843 F5	3850 H5	3867 B11	3895 G12	9811 F8
B4	3820 D3	3827 E10	3837 F7	3844 F5	3852 H5	3869 D3	3897 E7	9812 F8
A4	3821 D3	3828 G10	3838 F6	3845 F5	3853 E9	3870 E3	7801 E7	
A4	3822 D3	3831 B14	3839 G6	3846 F5	3857 C2	3873 D14	7806 G4	
B4	3823 D8	3832 D15	3840 H6	3847 F5	3862 B10	3889 D15	7807 H4	
H5	3824 D8	3833 A4	3841 G5	3848 H6	3863 H13	3892 E15	7877 D12	



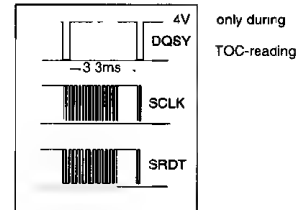
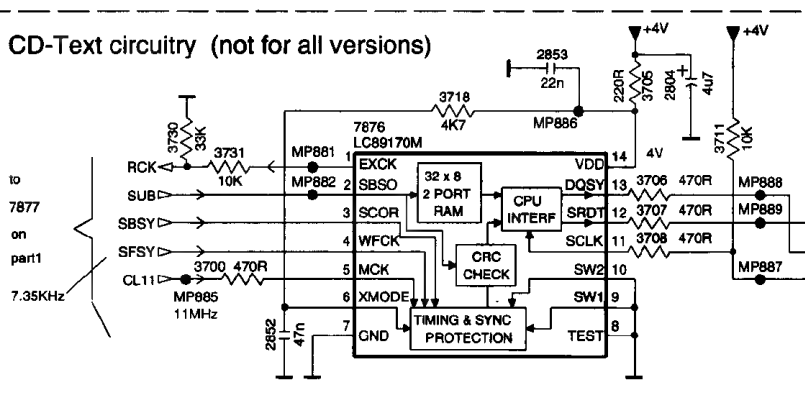


**digital out circuitry (not for all versions)**

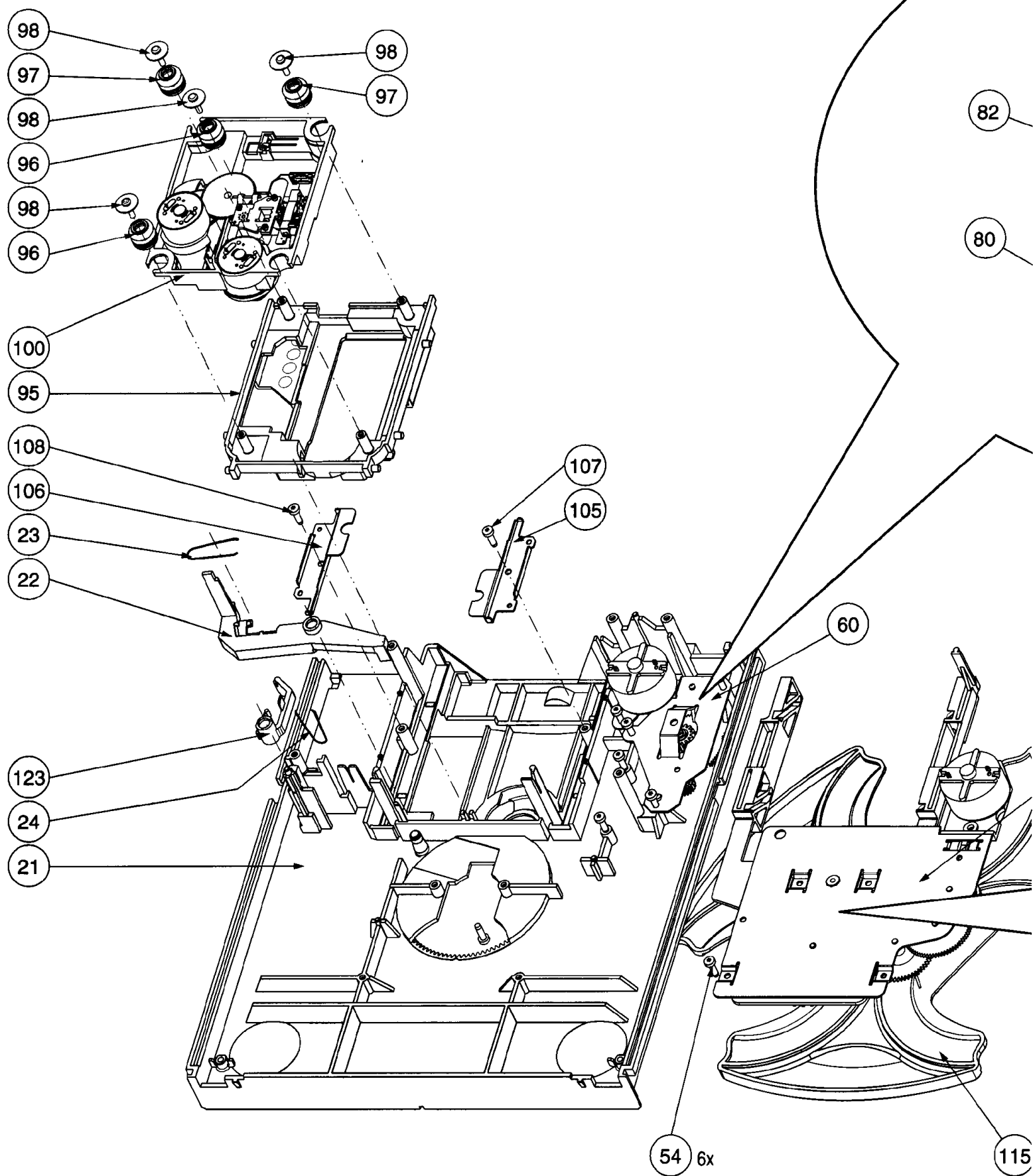
ITEM	OPT_OUT	COAX_OUT
3868	YES	NO
5802	NO	YES
9803	YES	NO
3809	YES	YES
3717	YES	NO
3716	NO	YES
3712	1R	10R
2865	NO	YES
2864	YES	YES
2854	NO	YES



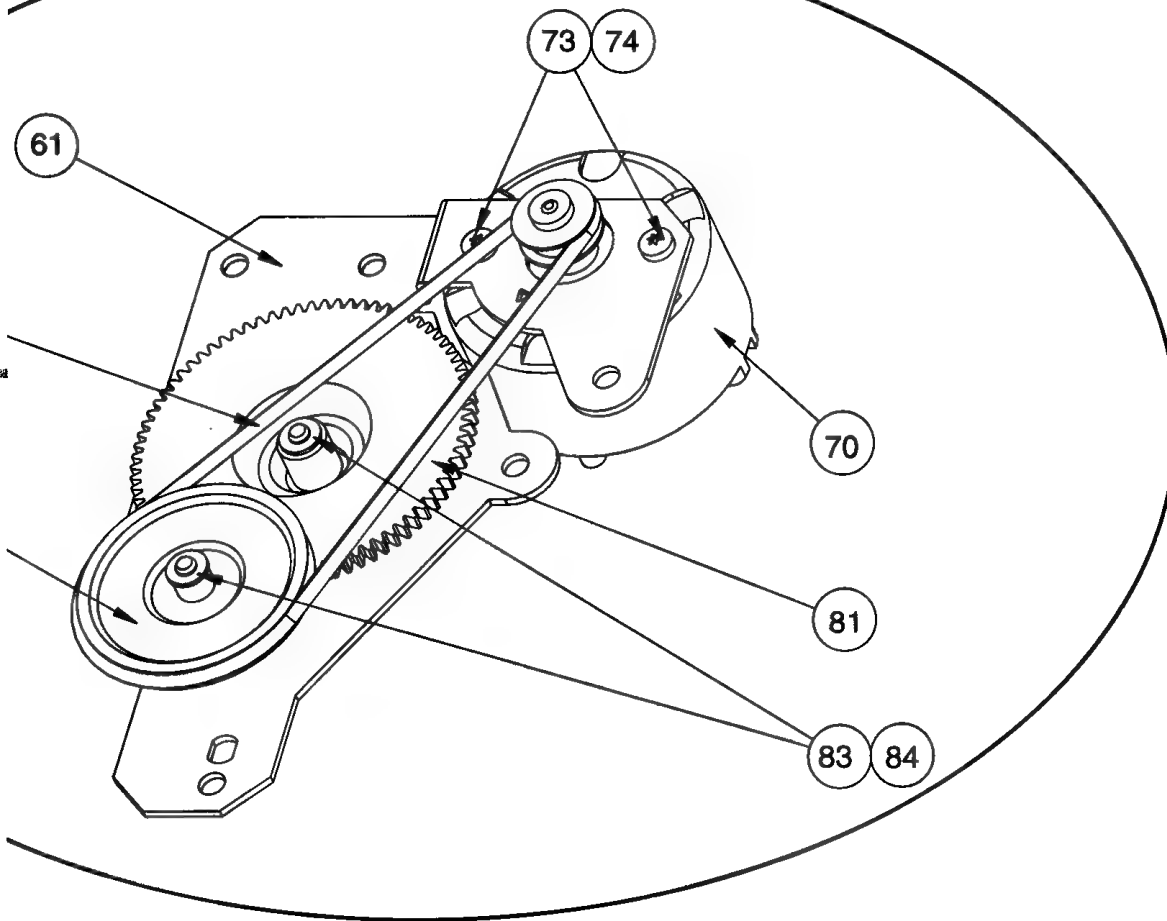
## CD-TEXT INFO



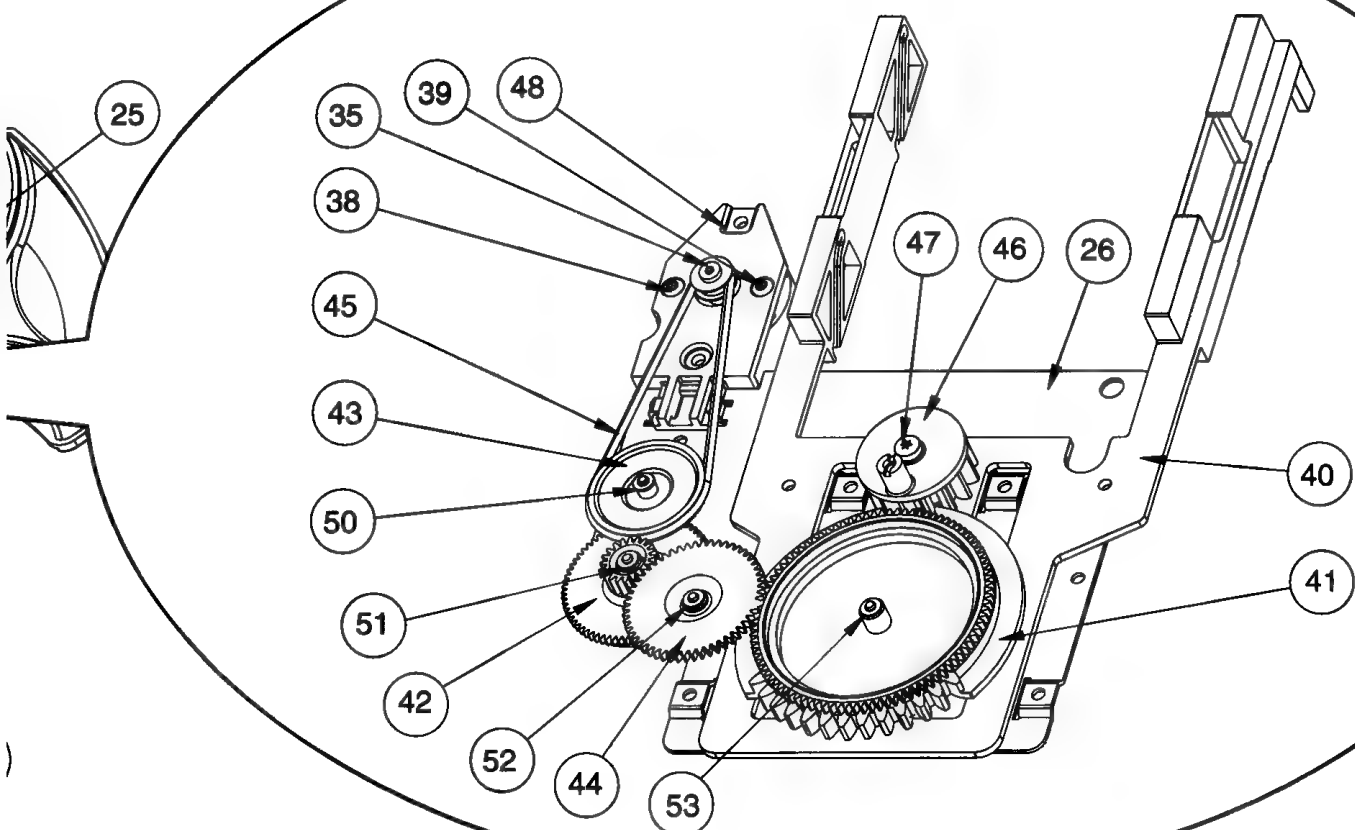


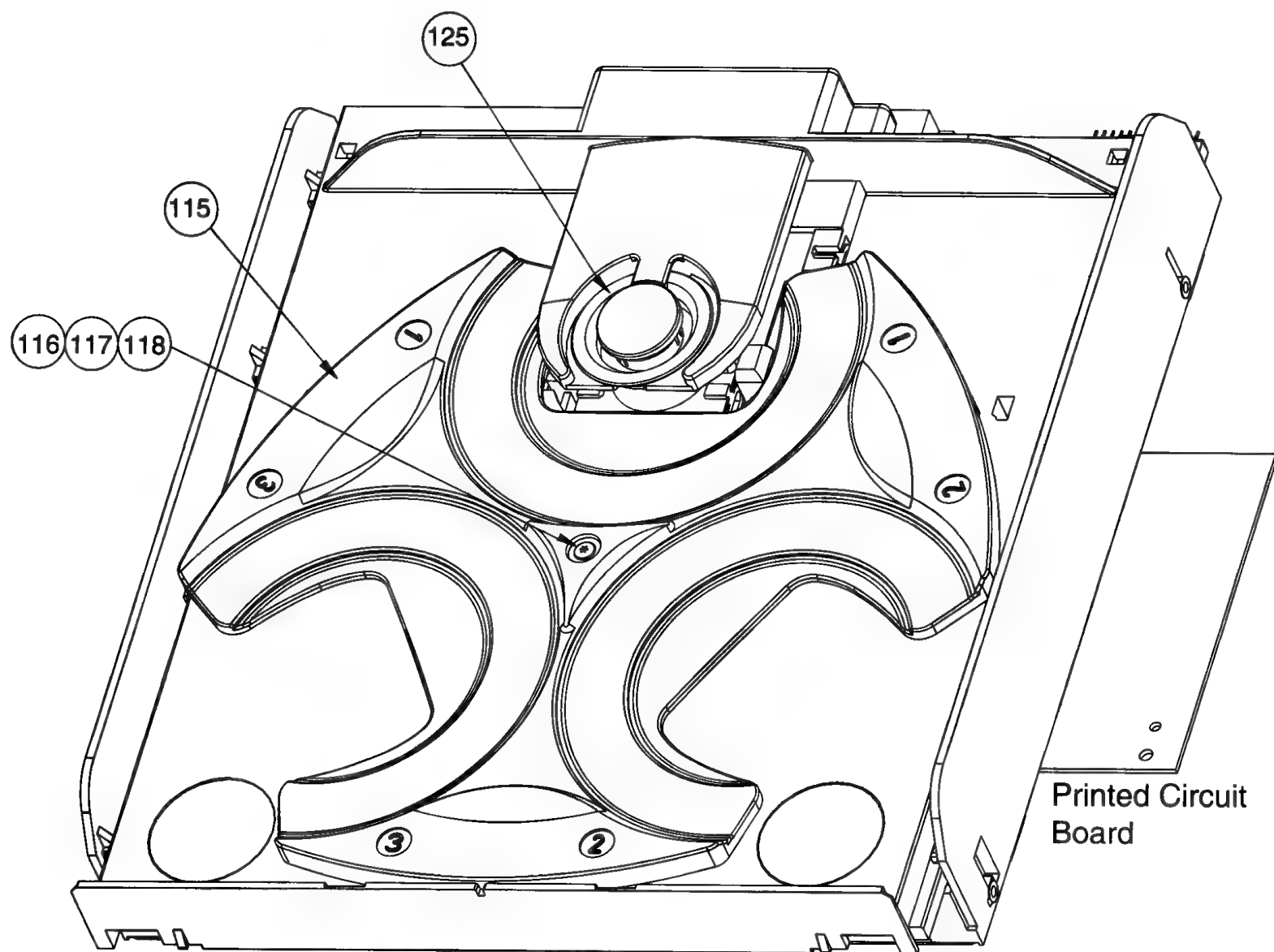


POS. 60



POS. 25

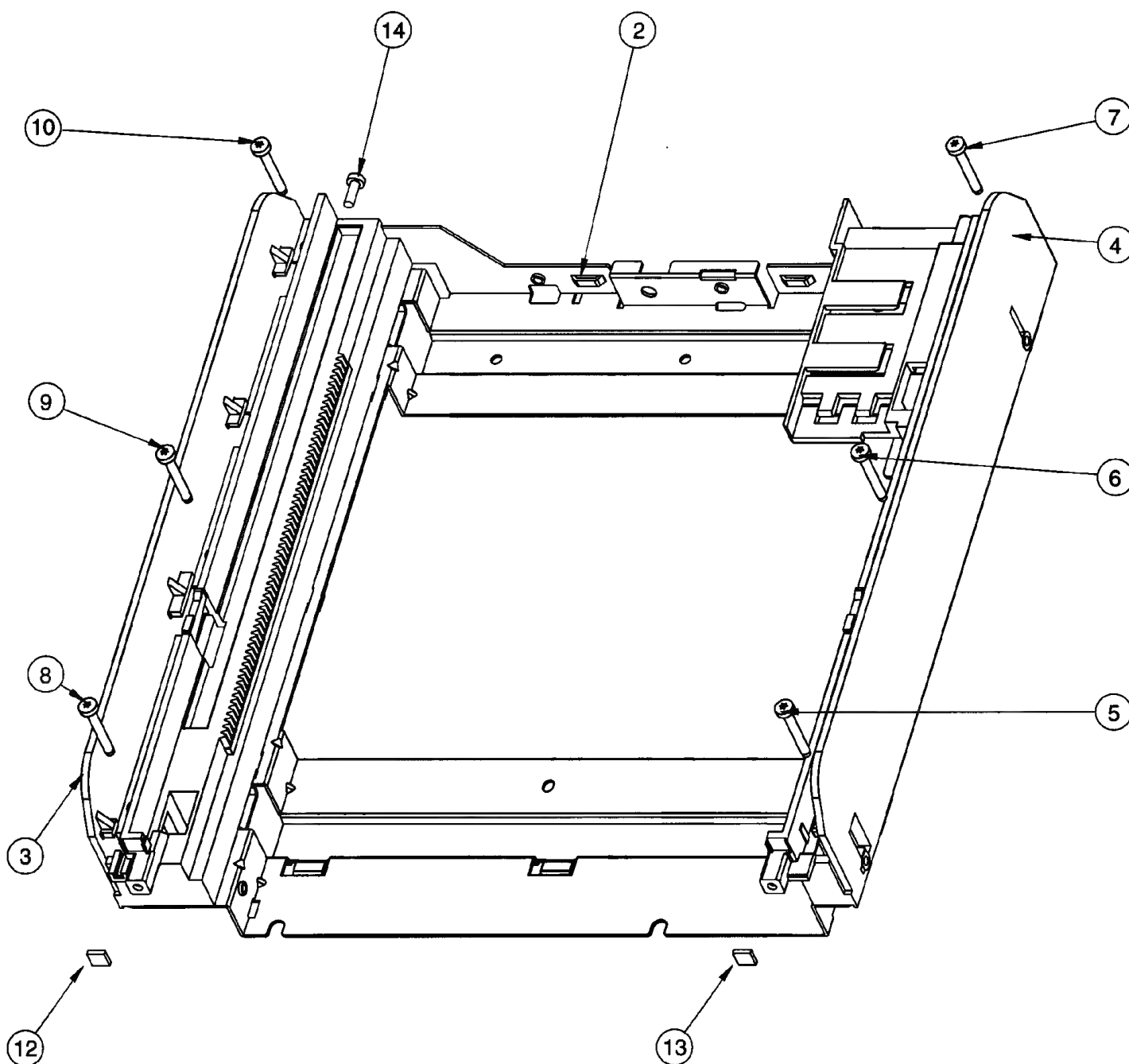




# **MECHANICAL PARTSLIST 3CDC-99 MODULE**

	4822 390 10136	POLYLUB GLY801 (GREASE)		43	4822 528 10937	PULLEY
3	4822 463 11008	GUIDE LEFT		44	4822 522 10493	IDLER WHEEL
4	4822 463 11009	GUIDE RIGHT		45	4822 358 10115	BELT
21	4822 441 11615	DRAWER		46	4822 466 10735	ECCENTRIC GEAR WHEEL
22	4822 402 10088	BRACKET TUMBLER		50	4822 532 12364	WASHER
38	4822 502 12548	SCREW M2,6X3,5		51	4822 532 12364	WASHER
39	4822 502 12548	SCREW M2,6X3,5		52	4822 532 12364	WASHER
40	4822 463 11011	SLIDE		53	4822 532 12364	WASHER
41	4822 522 10509	CONTROL DISC		35	4822 361 10753	CARROUSEL MOTOR
42	4822 522 10492	GEAR WHEEL		70	4822 361 10753	CARROUSEL MOTOR

continued on next page



# **MECHANICAL PARTSLIST 3CDC-99 MODULE**

73	4822 502 12548	SCREW M2.6X3,5	100	4822 691 10772	CD DRIVE VAM2201
74	4822 502 12548	SCREW M2.6X3,5	115	4822 466 10736	CARROUSEL
80	4822 528 10937	PULLEY	117	4822 532 12365	BUSH DRAWER
81	4822 522 10494	GEAR DRAWER	123	4822 402 11237	SWITCH BRACKET
82	4822 358 10115	BELT	125	4822 401 11708	DISC CLAMP
83	4822 532 12364	WASHER			
84	4822 532 12364	WASHER			
95	4822 404 10895	SUPPORT			
96	4822 529 10431	SUSPENSION			
97	4822 529 10431	SUSPENSION			

**ELECTRICAL PARTSLIST 3CDC-99 MODULE****MISCELLANEOUS**

1800	4822 265 10925	FLEX FOIL CONNECTOR 15PIN
1805	4822 265 11533	FLEX FOIL CONNECTOR 23PIN
1805	4822 267 51322	FLEX FOIL CONNECTOR 15 PIN
1880	4822 276 13503	SWITCH
1881	4822 276 13503	SWITCH

1882	4822 276 13503	SWITCH
------	----------------	--------

**CAPACITORS**

2800	4822 126 10053	180pF	10%	50V
2801	4822 122 10466	220pF	10%	50V
2802	4822 126 10053	180pF	10%	50V
2803	4822 122 10466	220pF	10%	50V
2804	4822 124 40246	4,7μF	20%	63V

2805	4822 122 10466	220pF	10%	50V
2806	4822 122 10466	220pF	10%	50V
2807	4822 126 12787	330pF	10%	50V
2808	4822 122 10466	220pF	10%	50V
2809	5322 124 41948	0,47μF	20%	50V

2810	4822 126 10053	180pF	10%	50V
2811	4822 122 10466	220pF	10%	50V
2814	4822 126 12785	47nF	20%	50V
2815	4822 126 12882	100nF	20%	50V
2816	4822 126 12878	1,5nF	10%	16V

2818	4822 126 12878	1,5nF	10%	16V
2822	4822 126 12339	2,2nF	10%	16V
2823	4822 122 33848	47pF	5%	50V
2824	4822 126 11585	22nF	20%	50V
2825	4822 126 12785	47nF	20%	50V

2826	4822 124 80231	47μF	20%	16V
2828	4822 124 40433	47μF	20%	25V
2829	4822 124 21732	10μF	20%	25V
2830	4822 126 12785	47nF	20%	50V
2831	4822 122 33195	100pF	10%	50V

2832	4822 122 33195	100pF	10%	50V
2833	4822 122 33069	33pF	5%	50V
2834	4822 122 33069	33pF	5%	50V
2835	4822 126 12785	47nF	20%	50V
2837	4822 124 40433	47μF	20%	25V

2838	4822 124 41579	10μF	20%	50V
2839	4822 124 40433	47μF	20%	25V
2840	4822 126 12882	100nF	20%	50V
2841	4822 126 12702	270pF	10%	50V
2842	4822 126 12339	2,2nF	10%	16V

2844	4822 126 12702	270pF	10%	50V
2849	4822 124 40246	4,7μF	20%	63V
2850	4822 122 33197	1nF	10%	50V
2851	4822 124 40196	220μF	20%	16V
2852	4822 126 12785	47nF	20%	50V

2853	4822 126 11585	22nF	20%	50V
2854	4822 126 12785	47nF	20%	50V
2855	4822 122 33519	470pF	10%	50V
2856	4822 122 33848	47pF	5%	50V
2857	4822 121 51387	10nF	20%	16V

2858	4822 124 40196	220μF	20%	16V
2859	4822 121 51387	10nF	20%	16V
2860	4822 124 41579	10μF	20%	50V
2861	4822 124 41579	10μF	20%	50V
2862	4822 122 10466	220pF	10%	50V

2863	4822 122 10466	220pF	10%	50V
2864	4822 122 33191	22pF	5%	50V
2865	4822 126 11585	22nF	20%	50V
2867	4822 122 10466	220pF	10%	50V
2869	4822 126 12785	47nF	20%	50V

**CAPACITORS**

2872	4822 126 12785	47nF	20%	50V
2873	4822 124 12233	47μF	20%	25V
2875	4822 126 11585	22nF	20%	50V
2876	4822 124 40196	220μF	20%	16V
2877	4822 122 10319	82pF	5%	50V

2878	4822 122 10466	220pF	10%	50V
2879	4822 126 12785	47nF	20%	50V
2882	4822 122 10466	220pF	10%	50V
2884	4822 124 40246	4,7μF	20%	63V
2885	4822 124 40246	4,7μF	20%	63V

2887	4822 126 12882	100nF	20%	50V
2888	4822 124 40246	4,7μF	20%	63V
2891	4822 122 10576	1,8nF	10%	16V
2892	4822 126 11714	4,7nF	20%	16V
2893	4822 122 10466	220pF	10%	50V

**RESISTORS**

3700	4822 116 83883	470Ω	5%	0,16W
3705	4822 116 83872	220Ω	5%	0,5W
3706	4822 116 83883	470Ω	5%	0,16W
3707	4822 116 83883	470Ω	5%	0,16W
3708	4822 116 83883	470Ω	5%	0,16W

3709	4822 116 83864	10kΩ	5%	0,5W
3711	4822 116 83864	10kΩ	5%	0,5W
3712	4822 116 52176	10Ω	5%	0,5W
3713	4822 116 52257	22kΩ	5%	0,5W
3714	4822 116 83864	10kΩ	5%	0,5W

3715	4822 116 52234	100kΩ	5%	0,5W
3716	4822 116 83883	470Ω	5%	0,16W
3718	4822 116 52283	4,7kΩ	5%	0,5W
3727	4822 116 52283	4,7kΩ	5%	0,5W
3728	4822 116 52283	4,7kΩ	5%	0,5W

3730	4822 116 52271	33kΩ	5%	0,16W
3731	4822 116 83864	10kΩ	5%	0,5W
3740	4822 116 52257	22kΩ	5%	0,5W
3741	4822 116 52257	22kΩ	5%	0,5W
3742	4822 116 52257	22kΩ	5%	0,5W

3743	4822 116 52257	22kΩ	5%	0,5W
3744	4822 116 83864	10kΩ	5%	0,5W
3746	4822 116 83864	10kΩ	5%	0,5W
3750	4822 050 11002	1kΩ	5%	0,2W
3751	4822 050 11002	1kΩ	5%	0,2W

3800	4822 116 52291	56kΩ	5%	0,5W
3801	4822 116 83864	10kΩ	5%	0,5W
3802	4822 116 52291	56kΩ	5%	0,5W
3803	4822 116 83864	10kΩ	5%	0,5W
3805	4822 116 83864	10kΩ	5%	0,5W

3806	4822 116 83864	10kΩ	5%	0,5W
3807	4822 116 83864	10kΩ	5%	0,5W
3808	4822 116 83864	10kΩ	5%	0,5W
3809	4822 116 83876	270Ω	5%	0,16W
3811	4822 116 52251	18kΩ	5%	0,5W

3812	4822 053 10228	2,2Ω	5%	1W
3814	4822 116 52191	33Ω	5%	0,5W
3815	4822 052 10478	4,7Ω	5%	NFR
3819	4822 116 83883	470Ω	5%	0,16W
3820	4822 116 52283	4,7kΩ	5%	0,5W

3821	4822 116 52283	4,7kΩ	5%	0,5W
3822	4822 116 52249	1,8kΩ	5%	0,16W
3823	4822 050 11002	1kΩ	5%	0,2W
3824	4822 050 11002	1kΩ	5%	0,2W
3825	4822 050 11002	1kΩ	5%	0,2W

3826	4822 116 52257	22kΩ	5%	0,5W
3827	4822 116 52271	33kΩ	5%	0,16W

**ELECTRICAL PARTSLIST 3CDC-99 MODULE****RESISTORS**

3828	4822 116 52257	22kΩ	5%	0,5W
3831	4822 116 52257	22kΩ	5%	0,5W
3832	4822 116 83864	10kΩ	5%	0,5W
3833	4822 116 52257	22kΩ	5%	0,5W
3834	4822 116 52257	22kΩ	5%	0,5W
3835	4822 052 10338	3,3Ω		NFR25
3837	4822 050 11002	1kΩ	5%	0,2W
3838	4822 050 11002	1kΩ	5%	0,2W
3839	4822 116 52234	100kΩ	5%	0,5W
3840	4822 116 52234	100kΩ	5%	0,5W
3841	4822 116 52283	4,7kΩ	5%	0,5W
3842	4822 116 83884	47kΩ	5%	0,16W
3843	4822 116 52271	33kΩ	5%	0,16W
3844	4822 116 52283	4,7kΩ	5%	0,5W
3845	4822 116 83884	47kΩ	5%	0,16W
3846	4822 116 52271	33kΩ	5%	0,16W
3847	4822 116 83961	6,8kΩ	5%	0,16W
3848	4822 116 52234	100kΩ	5%	0,5W
3849	4822 116 52234	100kΩ	5%	0,5W
3850	4822 116 52276	3,9kΩ	5%	0,5W
3851	4822 052 10338	3,3Ω		NFR25
3852	4822 052 10228	2,2Ω	5%	0,33W
3853	4822 116 83883	470Ω	5%	0,16W
3854	4822 116 52175	100Ω	5%	0,5W
3855	4822 116 52175	100Ω	5%	0,5W
3857	4822 116 52191	33Ω	5%	0,5W
3858	4822 116 52257	22kΩ	5%	0,5W
3859	4822 116 52257	22kΩ	5%	0,5W
3860	4822 116 83864	10kΩ	5%	0,5W
3861	4822 116 83864	10kΩ	5%	0,5W
3862	4822 116 52175	100Ω	5%	0,5W
3863	4822 116 52175	100Ω	5%	0,5W
3863	4822 116 52191	33Ω	5%	0,5W
3864	4822 116 52175	100Ω	5%	0,5W
3866	4822 116 83864	10kΩ	5%	0,5W
3867	4822 116 83868	150Ω	5%	0,5W
3869	4822 050 24708	4,7Ω	1%	0,6W
3870	4822 116 52175	100Ω	5%	0,5W
3871	4822 116 83864	10kΩ	5%	0,5W
3872	4822 116 83864	10kΩ	5%	0,5W
3873	4822 116 83883	470Ω	5%	0,16W
3874	4822 116 83864	10kΩ	5%	0,5W
3875	4822 116 83864	10kΩ	5%	0,5W
3876	4822 116 83864	10kΩ	5%	0,5W
3877	4822 116 83864	10kΩ	5%	0,5W
3878	4822 116 83864	10kΩ	5%	0,5W
3879	4822 116 83864	10kΩ	5%	0,5W
3880	4822 116 52219	330Ω	5%	0,5W
3881	4822 116 83864	10kΩ	5%	0,5W
3882	4822 116 83884	47kΩ	5%	0,16W
3883	4822 116 52234	100kΩ	5%	0,5W
3884	4822 116 52276	3,9kΩ	5%	0,5W
3885	4822 116 52234	100kΩ	5%	0,5W
3886	4822 116 83884	47kΩ	5%	0,16W
3887	4822 116 83883	470Ω	5%	0,16W
3888	4822 116 83864	10kΩ	5%	0,5W
3889	4822 116 83883	470Ω	5%	0,16W
3890	4822 050 11002	1kΩ	5%	0,2W
3891	4822 050 11002	1kΩ	5%	0,2W
3892	4822 116 83883	470Ω	5%	0,16W
3893	4822 116 83883	470Ω	5%	0,16W
3894	4822 116 52191	33Ω	5%	0,5W
3895	4822 116 52176	10Ω	5%	0,5W
3897	4822 116 52175	100Ω	5%	0,5W
3899	4822 116 52175	100Ω	5%	0,5W

**COILS**

1810	4822 242 10849	QUARTZ 8,46MHz
1810	4822 242 73557	CERAMIC RES. 8,46MHz
5802	4822 156 31058	FILTER DIGITAL OUT

**DIODES**

6871	4822 130 30621	1N4148
6872	4822 130 30621	1N4148
6873	4822 130 30621	1N4148
6874	4822 130 30621	1N4148
6875	4822 130 34233	BZX79-B5V1
6877	4822 130 31981	BZX79-C3V9

**TRANSISTORS**

7812	4822 130 40959	BC547B
7874	4822 130 40959	BC547B
7875	4822 130 40959	BC547B

**INTEGRATED CIRCUITS**

7801 ©	4822 209 17286	TZA1024T/N1 HF-AMPLIFIER
7805	4822 209 17284	TDA1308 OPAMP
7806	4822 209 32852	TDA7073A/N2 SERVO DRIVER
7807	4822 209 32852	TDA7073A/N2 MOTOR DRIVER
7871	4822 209 32852	TDA7073A/N2 MOTOR DRIVER
7873	5322 209 10421	HEF4094BP SHIFT REGISTER
7876 ©	4822 209 16143	LC89170M CD TEXT
7877 ©	4822 209 17285	SAA7324H/M1 SIGNAL PROCESSOR



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# COMBI BOARD

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## TABLE OF CONTENTS

Brief Introduction .....	11-1
Main part - Component and Chip layouts .....	11-2
Main part - Source Select & Amplifier .....	11-3
Main part - Power Supply .....	11-4
Transformer Primary part - Circuit & Layout .....	11-5
Karaoke & Headphone part - Circuit .....	11-6
Karaoke & Headphone part - Layouts .....	11-7
CDC Key part - Circuit & Layouts .....	11-7
Electrical parts list .....	11-8

## ***Brief introduction of the Combi Board***

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### **A. TRANSFORMER PRIMARY PART**

Transformer Primary Circuit provide connection for AC mains supply and primary wires of transformer.

### **B. POWER SUPPLY PART**

Power Supply Circuit consists of rectifiers, capacitive filters and voltage regulators. Regulated voltage include +5V6, +12A, +12M, -26V, PWDN. The +C supply to the power amplifier is not regulated. F1-F2 is the ac supply voltage to the FTD Display filament.

### **C. SOURCE SELECT & AMPLIFIER PART**

#### **a) SHIFT REGISTER (AF CONTROL)**

This shift register deliver commands from the  $\mu$ P to control the AF functions which include source selection (A0 & A1 control lines), DSC modes, DBB, IS and CD\_ON. Other control lines such as MUTE, AMPON, STBY and PWM are coming directly from the  $\mu$ P on the Front board.

#### **b) SOURCE SELECTION**

One of the 4 sources, namely AUX, TAPE, TUNER, CD, can be selected via A0 & A1 lines which control the IC 7501 (HEF4052BT). Karaoke mic. mixing is connected to the selected source before the signal is amplified with a buffer amplifier (Tr 7503 & 7504). The source signal is then split into recording path (for recording on tape) and main signal path (to the PWM volume control).

#### **c) PWM VOLUME CONTROL**

The discrete volume control makes use of 4 Transistors 7505, 7506, 7507 & 7508 (BC557B or ON4986) and PWM control signal from  $\mu$ P. For good performance transistors for the left and right channels should be paired for gain characteristics.

#### **d) SOUND FEATURES**

Sound Features include the DBB, IS and 4 DSC modes. The sound features are realised with a hex-inverter IC 7530 (HEF4069BT) as analog buffer/amplifier and transistors as electronic switches controlled by the shift registers (AF control).

#### **e) POWER AMPLIFIER**

IC 7391 (AN7125) is used as power amplifier.

#### **f) CD ON CONTROL**

This circuit switches on the supply +CD supply (derived from +12A) to CD servo control, HF circuit and the laser light pen on the CD Module during the CD mode only.

#### **g) MATRIX SURROUND OUTPUT**

The matrix surround feature is provided on board. This feature is only optional on certain type version.

### **D. KARAOKE & HEADPHONE PART**

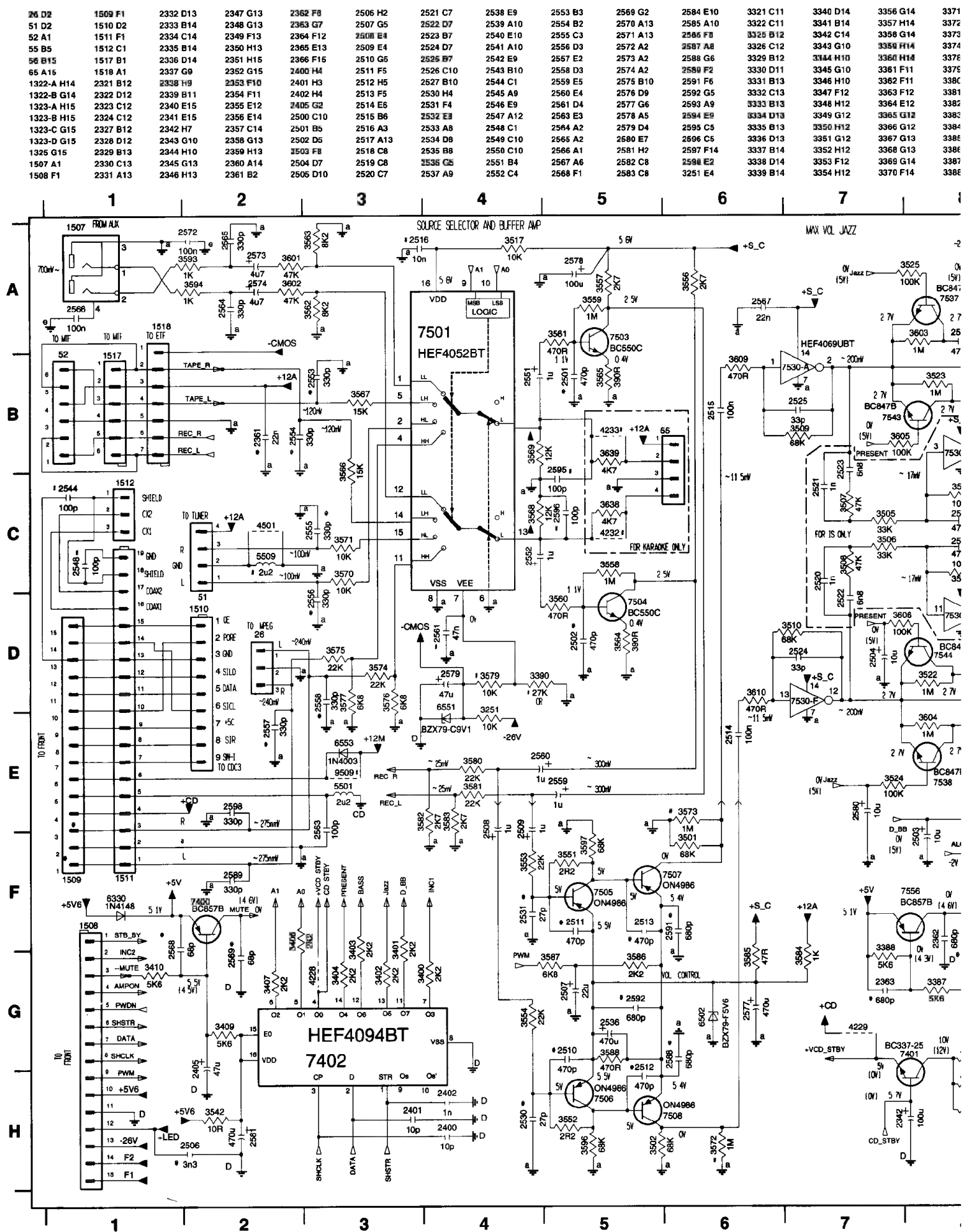
#### **a) SIMPLE KARAOKE**

This is a 1-mic. mono amplifier using discrete components. It has a level control using a rotary potmeter. This feature is available for some version only.

#### **g) HEADPHONE OUTPUT**

The headphone output is derived from the power amplifier output after the attenuation resistors which are tailored to deliver 18mW output power into a 32 ohm headphone.

## CIRCUIT DIAGRAM - SOURCE SELECT &amp; AMPLIFIER PART



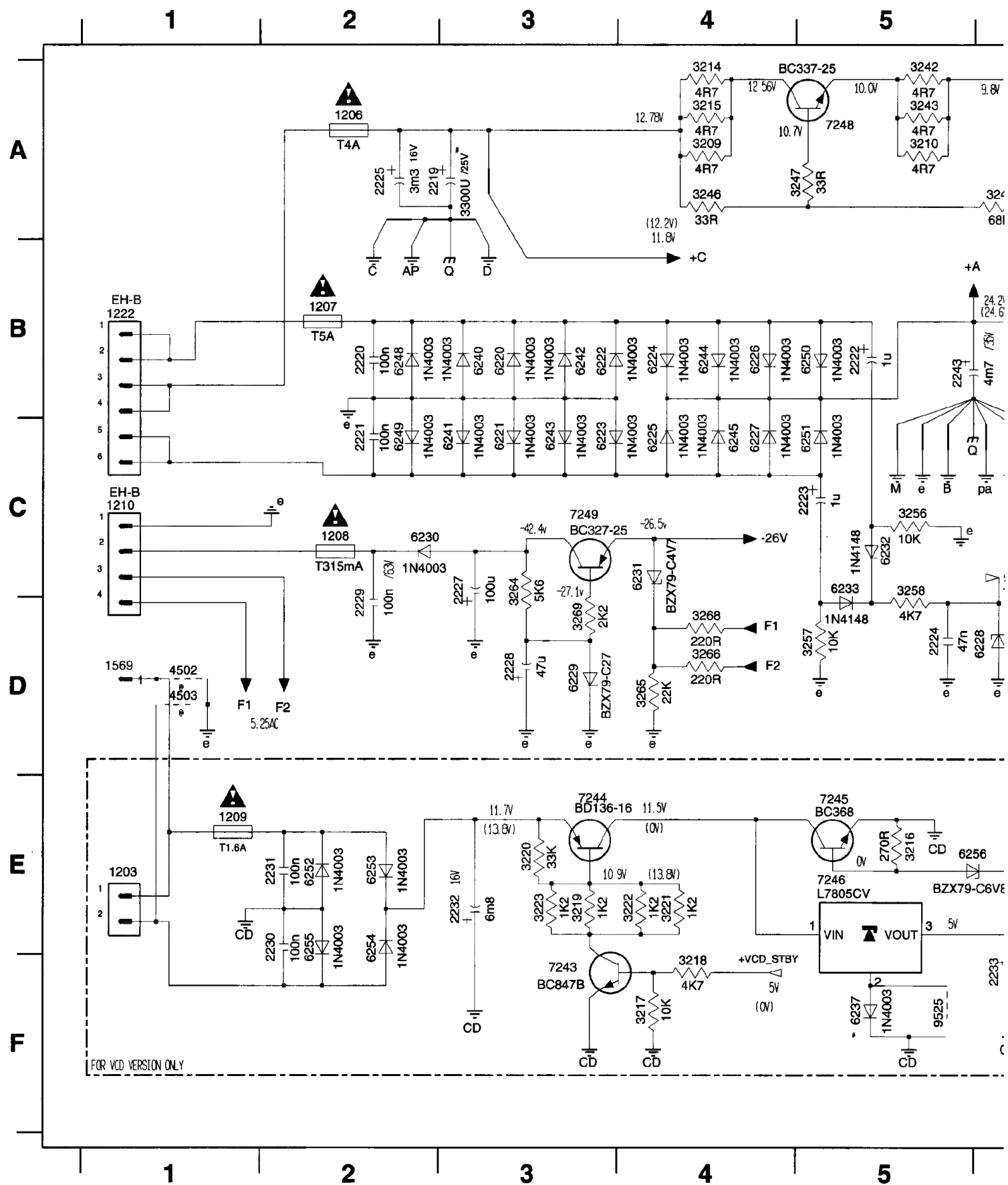
- Provision on layout
- △ For set with Karaoke
- ▲ For set without Karaoke
- Not For /37

	Inc 1	Inc 2	Jazz	Bass	POP	DBB
Jazz	x	x	L	H	L	L
Rock	x	x	H	H	H	H
Techno	x	x	L	H	L	H
Optimal	x	x	L	L	H	L
IS (vol <= 24)	H	H	x	x	x	x
IS (vol > 24)	L	H	x	x	x	x

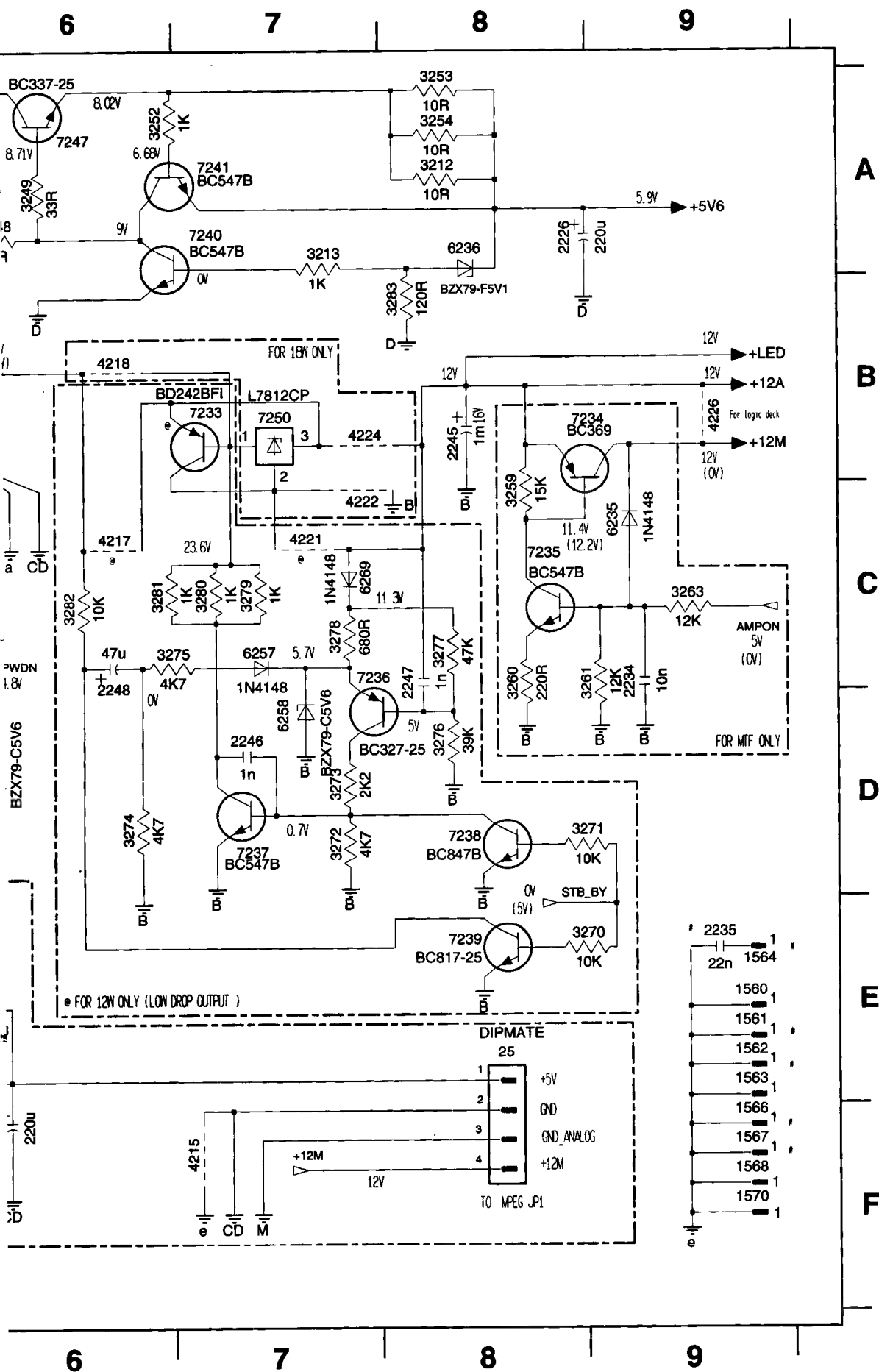


**PCS 102 510**

### CIRCUIT DIAGRAM - POWER SUPPLY PART



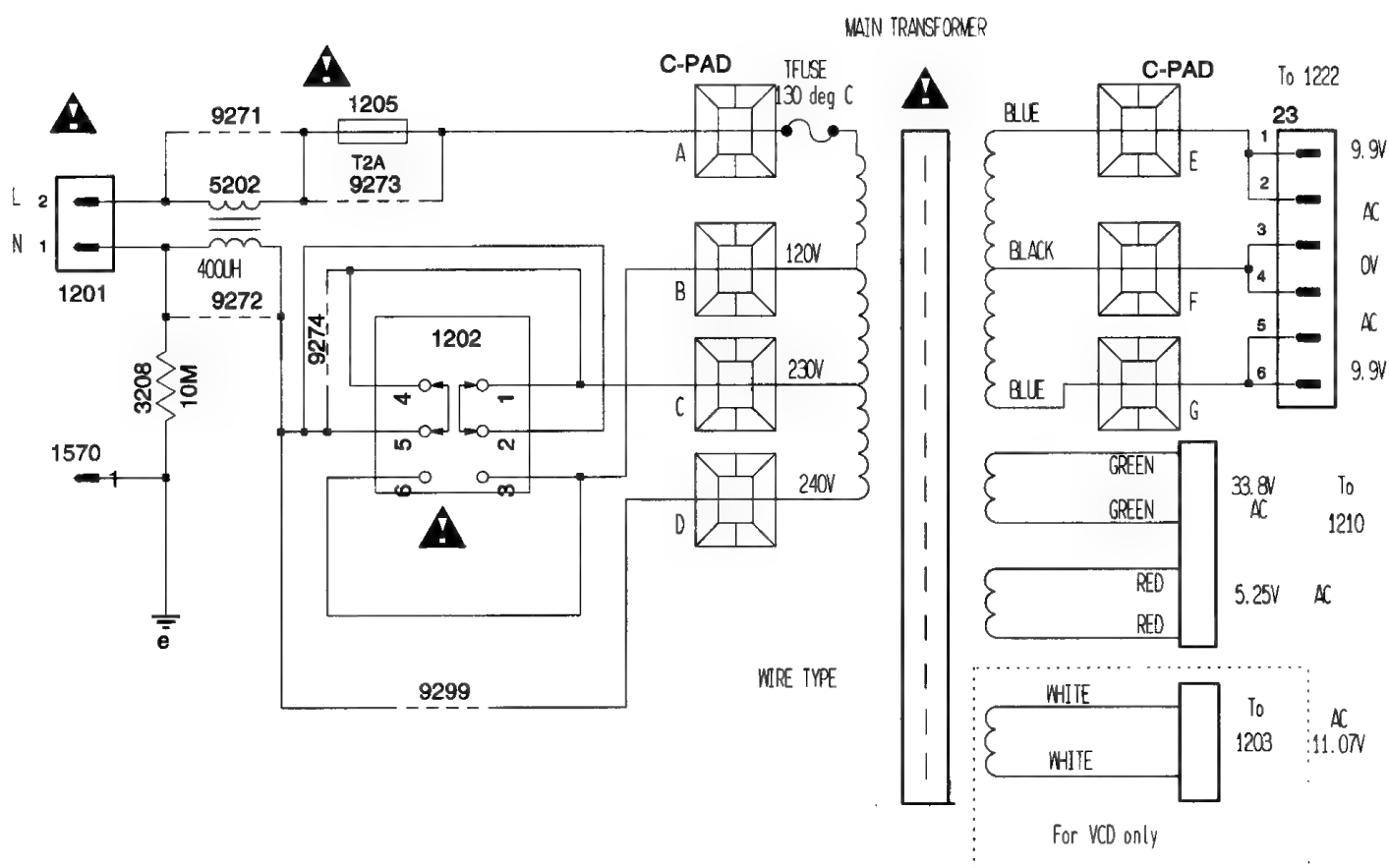
- Provision on Layout



25 E8	3259 C8	6269 C7
1203 E1	3260 C8	7233 B7
1206 A2	3261 C9	7234 B8
1207 B2	3263 C9	7235 C8
1208 C2	3264 C3	7236 C7
1209 E1	3265 D4	7237 D7
1210 C1	3266 D4	7238 D8
1222 B1	3268 D4	7239 E8
1560 E9	3269 D3	7240 A7
1561 E9	3270 E8	7241 A7
1562 E9	3271 D8	7243 F3
1563 E9	3272 D7	7244 E3
1564 E9	3273 D7	7245 E5
1566 F9	3274 D6	7246 E5
1567 F9	3275 C6	7247 A6
1568 F9	3276 D8	7248 A5
1569 D1	3277 C8	7249 C3
1570 F9	3278 C7	7250 B7
2119 A2	3279 C7	9525 F5
2220 B2	3280 C7	
2221 C2	3281 C6	
2222 B5	3282 C6	
2223 C5	3283 B8	
2224 D5	4215 F7	
2225 A2	4217 C6	
2226 A8	4218 B6	
2227 C3	4221 C7	
2228 D3	4222 C7	
2229 D2	4224 B7	
2230 E2	4226 B9	
2231 E2	4502 D1	
2232 E3	4503 D1	
2233 F6	6220 B3	
2234 C9	6221 C3	
2235 E9	6222 B3	
2243 B5	6223 C3	
2245 B8	6224 B4	
2246 D7	6225 C4	
2247 C8	6226 B4	
2248 C6	6227 C4	
3209 A4	6228 D5	
3210 A5	6229 D3	
3212 A8	6230 C2	
3213 A7	6231 C4	
3214 A4	6232 C5	
3215 A4	6233 C5	
3216 E5	6235 C9	
3217 F4	6236 A8	
3218 F4	6237 F5	
3219 E3	6240 B3	
3220 E3	6241 C3	
3221 E4	6242 B3	
3222 E4	6243 C3	
3223 E3	6244 B4	
3242 A5	6245 C4	
3243 A5	6248 B2	
3246 A4	6249 C2	
3247 A5	6250 B5	
3248 A6	6251 C5	
3249 A6	6252 E2	
3252 A6	6253 E2	
3253 A8	6254 E2	
3254 A8	6255 E2	
3256 C5	6256 E5	
3257 D5	6257 C7	
3258 C5	6258 D7	

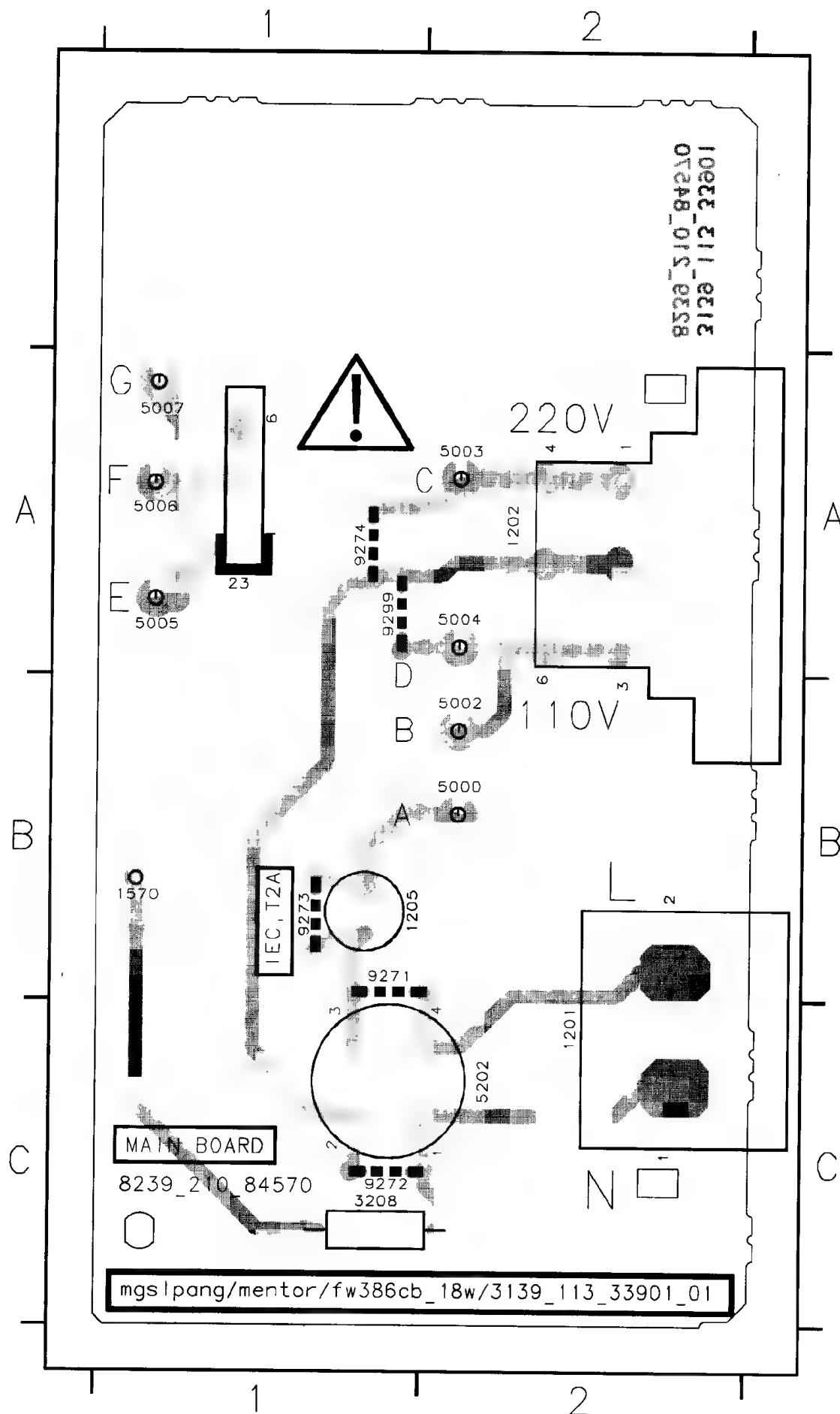
# E

# E



## COMPONENT LAYOUT - TRANSFORMER PRIMARY

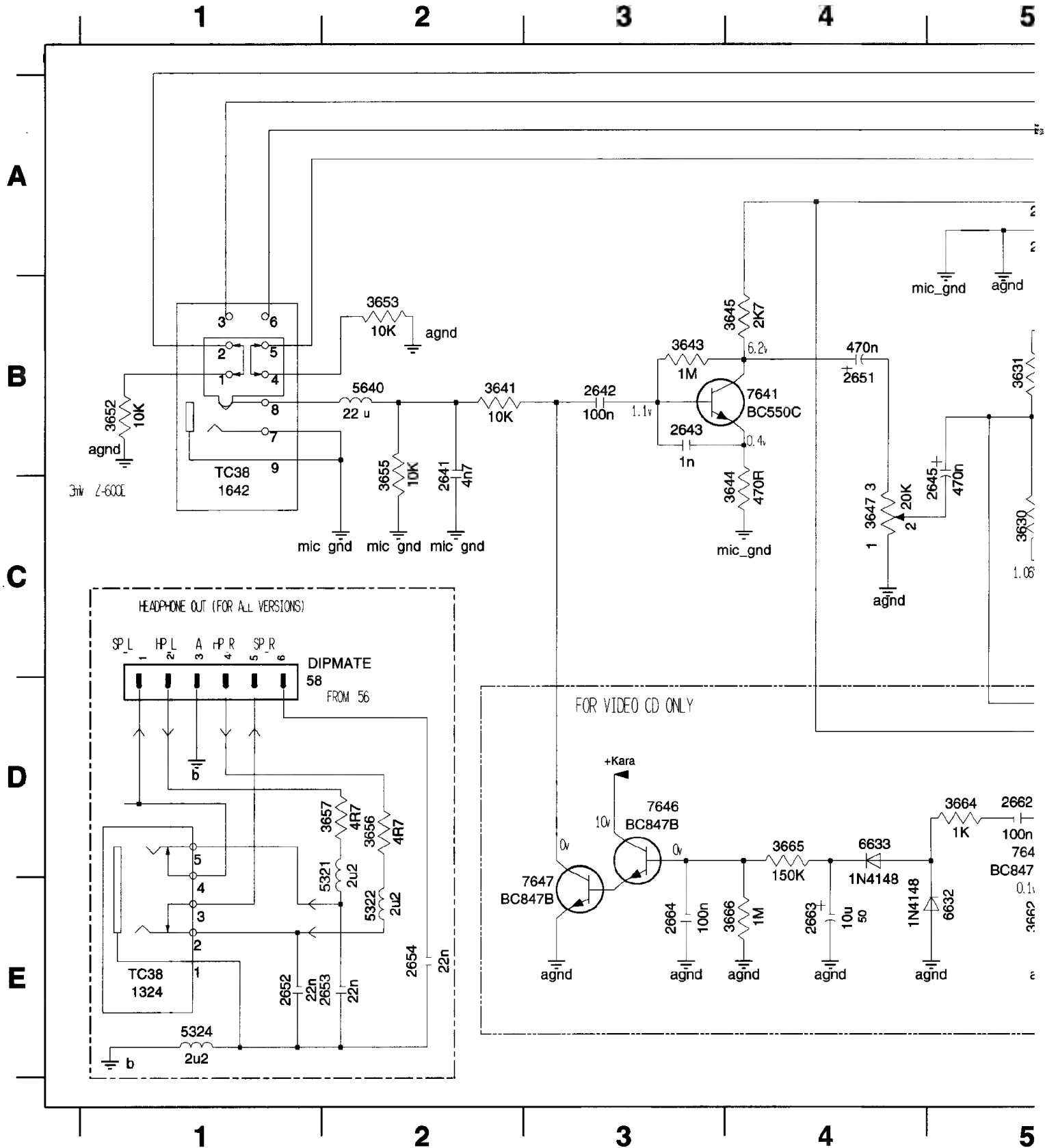
23 A1	1570 B1	5003 A2	5007 A1	9273 B1
1201 C2	3208 C1	5004 A2	5202 C2	9274 A1
1202 A2	5000 B2	5005 A1	9271 B1	9299 A1
1205 B1	5002 B2	5006 A1	9272 C1	



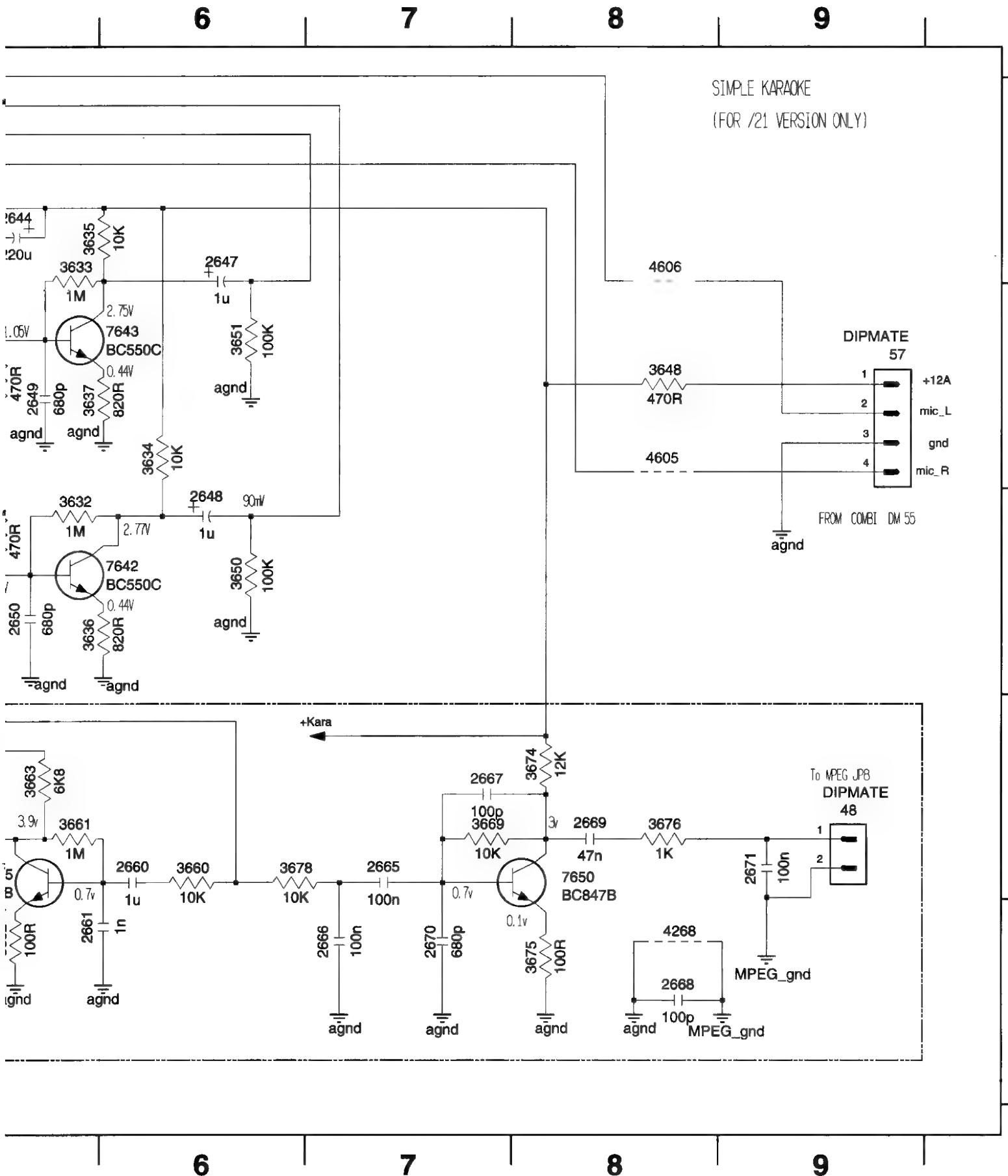


## CIRCUIT DIAGRAM - KARAOKE &amp; HEADPHONE PART

48 D9	1642 C1	2644 A5	2649 B5	2653 E2	2662 D5	2666 E7	2670 E7	3632 C5	3636 C5	3644 C4	3650 C6	3655 B2
57 B9	2641 B2	2645 C5	2650 C5	2654 E2	2663 E4	2667 D7	2671 D9	3633 A5	3637 B5	3645 B4	3651 B6	3656 D2
58 D1	2642 B3	2647 A6	2651 B4	2660 D6	2664 E3	2668 E8	3630 C5	3634 B6	3641 B2	3647 C4	3652 B1	3657 D2
1324 E1	2643 B3	2648 C6	2652 E1	2661 E5	2665 D7	2669 D8	3631 B5	3635 A5	3643 B3	3648 B8	3653 B2	3660 D6



3661 D5	3665 D4	3675 E8	4605 B8	5324 E1	7641 B4	7646 D3
3662 E5	3666 E4	3676 D8	4606 A8	5640 B2	7642 C6	7647 E3
3663 D5	3669 D7	3678 D6	5321 D2	6632 E5	7643 B6	7650 D8
3664 D5	3674 D8	4268 E8	5322 E2	6633 D4	7645 D5	



**ELECTRICAL PARTS LIST - COMBI BOARD****MISCELLANEOUS**

1201	4822 265 31015	△ Mains Socket
1201	4822 265 31016	△ Mains Socket UL /37
1202	4822 272 10269	△ Voltage Selector /21/21M
1205	4822 071 52002	△ Fuse T2A 250V /21/21M
1206	4822 071 54002	△ Fuse T4A 250V
1206	4822 071 55002	△ Fuse T5A 250V /37
1207	4822 071 55002	△ Fuse T5A 250V
1208	4822 071 53151	△ Fuse T315mA 250V
1208	4822 252 51151	△ Fuse T315mA 250V /37
1322	4822 267 31176	Loudspeaker Socket L/R
1323	4822 265 10463	Loudspeaker Socket Matrix
1324	4822 265 11547	Headphone Socket
1325	4822 267 31729	Subwoofer-Out Socket
1431	4822 276 13775	Tact Switch
1432	4822 276 13775	Tact Switch
1433	4822 276 13775	Tact Switch
1434	4822 276 13775	Tact Switch
1435	4822 276 13775	Tact Switch
1507	4822 265 20553	Aux-In Socket
1508	4822 265 10981	Flex Socket 15pin Vert.
1509	4822 265 10981	Flex Socket 15pin Vert.
1510	4822 265 11532	Flex Socket 9pin Vert.
1518	4822 267 10953	Flex Socket 7pin Vert.
1642	4822 265 11529	Mic Socket /21/21M

**CAPACITORS**

2220	5322 121 42386	100nF 5% 63V
2221	5322 121 42386	100nF 5% 63V
2222	4822 124 40242	1µF 20% 63V
2223	4822 124 40242	1µF 20% 63V
2224	4822 121 51399	47nF 10% 50V
2225	4822 124 40784	3300µF 20% 16V
2226	4822 124 22263	220µF 20% 25V
2227	4822 124 40255	100µF 20% 63V
2228	4822 124 41751	47µF 20% 50V
2229	5322 121 42386	100nF 5% 63V
2243	4822 124 80563	4700µF 20% 35V
2245	4822 123 14024	1000µF 20% 16V
2321	5322 122 32531	100pF 5% 50V
2322	5322 122 32531	100pF 5% 50V
2323	4822 124 40242	1µF 20% 63V
2324	4822 124 40242	1µF 20% 63V
2327	5322 122 34099	470pF 10% 63V
2328	5322 122 34099	470pF 10% 63V
2331	4822 122 33575	220pF 5% 50V
2332	4822 122 33575	220pF 5% 50V
2333	4822 124 40433	47µF 20% 25V
2334	4822 124 40433	47µF 20% 25V
2335	4822 122 32535	680pF 10% 63V
2336	4822 122 32535	680pF 10% 63V
2337	4822 124 40246	4,7µF 20% 63V
2338	4822 124 40246	4,7µF 20% 63V

2339	4822 124 40433	47µF 20% 25V
2340	5322 126 10223	4,7nF 10% 63V
2341	4822 122 32535	680pF 10% 63V
2342	4822 124 81029	100µF 20% 25V
2343	5322 122 32658	22pF 5% 50V
2344	5322 122 32658	22pF 5% 50V
2345	4822 126 13196	100nF 10% 25V
2346	4822 126 13196	100nF 10% 25V
2347	4822 121 42408	220nF 5% 63V
2348	4822 121 42408	220nF 5% 63V
2349	4822 121 42408	220nF 5% 63V
2350	4822 121 42408	220nF 5% 63V
2351	4822 124 22263	220µF 20% 25V
2352	4822 124 22263	220µF 20% 25V
2353	4822 124 22263	220µF 20% 25V
2354	4822 124 40246	4,7µF 20% 63V
2355	4822 122 33175	2,2nF 20% 50V
2356	4822 124 40242	1µF 20% 63V
2357	4822 124 40433	47µF 20% 25V
2358	4822 122 33177	10nF 20% 50V
2359	4822 122 33177	10nF 20% 50V
2360	5322 122 32654	22nF 10% 63V
2361	5322 122 32654	22nF 10% 63V
2362	4822 122 32535	680pF 10% 63V
2363	4822 122 32535	680pF 10% 63V
2364	4822 122 32535	680pF 10% 63V
2365	4822 122 32535	680pF 10% 63V
2400	5322 122 32448	10pF 5% 63V
2401	5322 122 32448	10pF 5% 63V
2402	5322 122 34123	1nF 10% 50V
2405	4822 124 40433	47µF 20% 25V
2500	4822 124 22263	220µF 20% 25V
2501	5322 122 32268	470pF 10% 50V
2502	5322 122 32268	470pF 10% 50V
2503	4822 124 41579	10µF 20% 50V
2504	4822 124 41579	10µF 20% 50V
2505	4822 124 40433	47µF 20% 25V
2506	4822 122 33891	3,3nF 10% 63V
2507	4822 124 81151	22µF 50V
2508	4822 124 40242	1µF 20% 63V
2509	4822 124 40242	1µF 20% 63V
2510	5322 122 34099	470pF 10% 63V
2511	5322 122 34099	470pF 10% 63V
2512	5322 122 34099	470pF 10% 63V
2513	5322 122 34099	470pF 10% 63V
2514	4822 126 10002	100nF 20% 25V
2515	4822 126 10002	100nF 20% 25V
2518	5322 122 34099	470pF 10% 63V
2519	5322 122 34099	470pF 10% 63V
2520	5322 122 34123	1nF 10% 50V
2521	5322 122 34123	1nF 10% 50V
2522	5322 122 31866	6,8nF 10% 63V

**ELECTRICAL PARTS LIST - COMBI BOARD**

2523	5322 122 31866	6,8nF 10% 63V
2524	5322 122 32659	33pF 5% 50V
2525	5322 122 32659	33pF 5% 50V
2530	4822 126 13691	27pF 1% 63V
2531	4822 126 13691	27pF 1% 63V
2532	5322 122 34099	470pF 10% 63V
2533	5322 122 34099	470pF 10% 63V
2534	5322 122 31865	1,5nF 10% 63V
2535	5322 122 31865	1,5nF 10% 63V
2536	4822 124 80195	470µF 20% 10V
2537	4822 126 10002	100nF 20% 25V
2538	4822 126 10002	100nF 20% 25V
2539	5322 122 32654	22nF 10% 63V
2540	5322 122 32654	22nF 10% 63V
2541	4822 126 13751	47nF 10% 63V
2542	4822 126 13751	47nF 10% 63V
2543	4822 124 41579	10µF 20% 50V
2545	4822 126 10002	100nF 20% 25V
2546	4822 126 10002	100nF 20% 25V
2547	4822 124 41584	100µF 20% 10V
2549	4822 126 10002	100nF 20% 25V
2550	4822 126 10002	100nF 20% 25V
2551	4822 124 40242	1µF 20% 63V
2552	4822 124 40242	1µF 20% 63V
2553	4822 122 33805	330pF 10% 63V
2554	4822 122 33805	330pF 10% 63V
2555	4822 122 33805	330pF 10% 63V
2556	4822 122 33805	330pF 10% 63V
2559	4822 124 40242	1µF 20% 63V
2560	4822 124 40242	1µF 20% 63V
2563	5322 122 32531	100pF 5% 50V
2564	4822 122 33805	330pF 10% 63V
2565	4822 122 33805	330pF 10% 63V
2566	4822 126 10002	100nF 20% 25V
2567	5322 122 32654	22nF 10% 63V
2568	4822 126 13694	68pF 1% 63V
2569	4822 126 13694	68pF 1% 63V
2570	4822 122 32535	680pF 10% 63V
2571	4822 122 32535	680pF 10% 63V
2572	4822 126 10002	100nF 20% 25V
2573	4822 124 40246	4,7µF 20% 63V
2574	4822 124 40246	4,7µF 20% 63V
2577	4822 124 80195	470µF 20% 10V
2578	4822 124 81029	100µF 20% 25V
2579	4822 124 40433	47µF 20% 25V
2580	4822 124 41579	10µF 20% 50V
2581	4822 124 80195	470µF 20% 10V
2582	4822 126 13061	220nF 20% 25V
2583	4822 126 13061	220nF 20% 25V
2584	4822 126 13692	47pF 1% 63V
2585	4822 126 13692	47pF 1% 63V
2588	4822 122 32535	680pF 10% 63V

2589	4822 122 33805	330pF 10% 63V
2591	4822 122 32535	680pF 10% 63V
2592	4822 122 32535	680pF 10% 63V
2593	4822 126 13692	47pF 1% 63V
2594	4822 126 13692	47pF 1% 63V
2597	5322 122 31865	1,5nF 10% 63V
2598	4822 122 33805	330pF 10% 63V
2641	5322 126 10223	4,7nF 10% 63V
2642	5322 121 42386	100nF 5% 63V
2643	5322 122 34123	1nF 10% 50V
2644	4822 124 22263	220µF 20% 25V
2645	4822 124 41407	0,47µF 20% 63V
2647	4822 124 40242	1µF 20% 63V
2648	4822 124 40242	1µF 20% 63V
2649	4822 122 32535	680pF 10% 63V
2650	4822 122 32535	680pF 10% 63V
2651	4822 124 41407	0,47µF 20% 63V
2652	5322 122 32654	22nF 10% 63V
2653	5322 122 32654	22nF 10% 63V
2654	5322 122 32654	22nF 10% 63V

**RESISTORS**

3208	4822 053 21106	10M 5% 0,5W /37
3209	4822 051 20478	4R7 5% 0,1W
3210	4822 051 20478	4R7 5% 0,1W
3212	4822 051 20109	10R 5% 0,1W
3213	4822 051 10102	1k 2% 0,25W
3214	4822 051 20478	4R7 5% 0,1W
3215	4822 051 20478	4R7 5% 0,1W
3242	4822 051 20478	4R7 5% 0,1W
3243	4822 051 20478	4R7 5% 0,1W
3246	4822 116 52191	33R 5% 0,5W
3247	4822 051 20339	33R 5% 0,1W
3248	4822 116 52199	68R 5% 0,5W
3249	4822 051 20339	33R 5% 0,1W
3251	4822 117 10833	10k 1% 0,1W
3252	4822 051 10102	1k 2% 0,25W
3253	4822 051 20109	10R 5% 0,1W
3254	4822 051 20109	10R 5% 0,1W
3256	4822 116 83864	10k 5% 0,5W
3257	4822 116 83864	10k 5% 0,5W
3258	4822 116 52283	4k7 5% 0,5W
3264	4822 116 52289	5k6 5% 0,5W
3265	4822 116 52257	22k 5% 0,5W
3266	4822 116 83872	220R 5% 0,5W
3268	4822 116 83872	220R 5% 0,5W
3269	4822 116 52256	2k2 5% 0,5W
3283	4822 051 20121	120R 5% 0,1W
3321	4822 116 52256	2k2 5% 0,5W
3322	4822 116 52256	2k2 5% 0,5W
3325	4822 051 20104	100k 5% 0,1W
3326	4822 051 20104	100k 5% 0,1W

## RESISTORS

3329	4822 051 20472	4k7 5% 0,1W	3385	4822 117 10834	47k 1% 0,1W
3330	4822 051 20472	4k7 5% 0,1W	3386	4822 117 10834	47k 1% 0,1W
3331	4822 117 11383	12k 1% 0,1W	3387	4822 051 20562	5k6 5% 0,1W
3332	4822 117 11383	12k 1% 0,1W	3388	4822 051 20562	5k6 5% 0,1W
3333	4822 117 11449	2k2 1% 0,1W	3390	4822 051 20008	0R Jumper 0805
3334	4822 117 11449	2k2 1% 0,1W	3400	4822 117 11449	2k2 1% 0,1W
3335	4822 051 20273	27k 5% 0,1W	3401	4822 117 11449	2k2 1% 0,1W
3336	4822 051 20273	27k 5% 0,1W	3402	4822 117 11449	2k2 1% 0,1W
3337	4822 051 20479	47R 5% 0,1W	3403	4822 117 11449	2k2 1% 0,1W
3338	4822 051 20479	47R 5% 0,1W	3404	4822 117 11449	2k2 1% 0,1W
3339	4822 051 20479	47R 5% 0,1W	3406	4822 117 11449	2k2 1% 0,1W
3340	4822 051 20479	47R 5% 0,1W	3407	4822 117 11449	2k2 1% 0,1W
3341	4822 051 10102	1k 2% 0,25W	3409	4822 051 20562	5k6 5% 0,1W
3342	4822 051 10102	1k 2% 0,25W	3410	4822 051 20562	5k6 5% 0,1W
3343	4822 051 20154	150k 5% 0,1W	3411	4822 116 52175	100R 5% 0,5W
3344	4822 051 20154	150k 5% 0,1W	3412	4822 116 52175	100R 5% 0,5W
3345	4822 117 10833	10k 1% 0,1W	3413	4822 116 52175	100R 5% 0,5W
3346	4822 117 10833	10k 1% 0,1W	3450	4822 051 20331	330R 5% 0,1W
3347	4822 117 10833	10k 1% 0,1W	3451	4822 051 20331	330R 5% 0,1W
3348	4822 117 10833	10k 1% 0,1W	3452	4822 051 20331	330R 5% 0,1W
3349	4822 117 10833	10k 1% 0,1W	3501	4822 051 20683	68k 5% 0,1W
3350	4822 117 10833	10k 1% 0,1W	3502	4822 051 20683	68k 5% 0,1W
3351	4822 051 20228	2R2 5% 0,1W	3503	4822 051 20104	100k 5% 0,1W
3352	4822 051 20228	2R2 5% 0,1W	3504	4822 051 20104	100k 5% 0,1W
3353	4822 051 20228	2R2 5% 0,1W	3505	4822 051 20333	33k 5% 0,1W
3354	4822 051 20228	2R2 5% 0,1W	3506	4822 051 20333	33k 5% 0,1W
3356	4822 116 83872	220R 5% 0,5W	3507	4822 117 10834	47k 1% 0,1W
3357	4822 116 83872	220R 5% 0,5W	3508	4822 117 10834	47k 1% 0,1W
3358	4822 116 83872	220R 5% 0,5W	3509	4822 051 20683	68k 5% 0,1W
3359	4822 116 83872	220R 5% 0,5W	3510	4822 051 20683	68k 5% 0,1W
3360	4822 116 83872	220R 5% 0,5W	3511	4822 051 20474	470k 5% 0,1W
3361	4822 116 52249	1k8 5% 0,5W	3512	4822 051 20474	470k 5% 0,1W
3362	4822 116 52249	1k8 5% 0,5W	3517	4822 117 10833	10k 1% 0,1W
3363	4822 116 52249	1k8 5% 0,5W	3518	4822 051 20333	33k 5% 0,1W
3364	4822 116 83883	470R 5% 0,5W	3519	4822 051 20333	33k 5% 0,1W
3365	4822 116 83872	220R 5% 0,5W	3522	4822 051 20105	1M 5% 0,1W
3366	4822 116 52283	4k7 5% 0,5W	3523	4822 051 20105	1M 5% 0,1W
3367	4822 051 10102	1k 2% 0,25W	3524	4822 051 20104	100k 5% 0,1W
3368	4822 051 10102	1k 2% 0,25W	3525	4822 051 20104	100k 5% 0,1W
3369	4822 051 10102	1k 2% 0,25W	3526	4822 051 20273	27k 5% 0,1W
3370	4822 051 10102	1k 2% 0,25W	3527	4822 051 20273	27k 5% 0,1W
3371	4822 117 10353	150R 1% 0,1W	3528	4822 117 10833	10k 1% 0,1W
3372	4822 051 20109	10R 5% 0,1W	3529	4822 117 10833	10k 1% 0,1W
3373	4822 116 52219	330R 5% 0,5W	3530	4822 051 20333	33k 5% 0,1W
3374	4822 116 83872	220R 5% 0,5W	3531	4822 051 20333	33k 5% 0,1W
3378	4822 051 20106	10M 5% 0,1W	3532	4822 051 20333	33k 5% 0,1W
3379	4822 051 20472	4k7 5% 0,1W	3533	4822 051 20333	33k 5% 0,1W
3380	4822 051 20392	3k9 5% 0,1W	3534	4822 051 20104	100k 5% 0,1W
3381	4822 116 52175	100R 5% 0,5W	3535	4822 051 20104	100k 5% 0,1W
3382	4822 051 20153	15k 5% 0,1W	3536	4822 117 10833	10k 1% 0,1W
3383	4822 051 20223	22k 5% 0,1W	3537	4822 117 10833	10k 1% 0,1W
3384	4822 051 20223	22k 5% 0,1W	3538	4822 117 11149	82k 1% 0,1W

3539	4822 117 11149	82k 1% 0,1W	3602	4822 116 83884	47k 5% 0,5W
3540	4822 051 20154	150k 5% 0,1W	3603	4822 051 20105	1M 5% 0,1W
3541	4822 051 20154	150k 5% 0,1W	3604	4822 051 20105	1M 5% 0,1W
3542	4822 116 52176	10R 5% 0,5W	3605	4822 051 20104	100k 5% 0,1W
3543	4822 051 20474	470k 5% 0,1W	3606	4822 051 20104	100k 5% 0,1W
3544	4822 051 20474	470k 5% 0,1W	3609	4822 116 83883	470R 5% 0,5W
3545	4822 051 20104	100k 5% 0,1W	3610	4822 116 83883	470R 5% 0,5W
3546	4822 051 20104	100k 5% 0,1W	3611	4822 051 20153	15k 5% 0,1W
3547	4822 051 20471	470R 5% 0,1W	3616	4822 051 20104	100k 5% 0,1W
3548	4822 051 20471	470R 5% 0,1W	3617	4822 117 11139	1k5 1% 0,1W
3549	4822 051 20472	4k7 5% 0,1W	3618	4822 117 11139	1k5 1% 0,1W
3550	4822 117 11149	82k 1% 0,1W	3630	4822 051 20471	470R 5% 0,1W
3551	4822 051 20228	2R2 5% 0,1W	3631	4822 051 20471	470R 5% 0,1W
3552	4822 051 20228	2R2 5% 0,1W	3632	4822 051 20105	1M 5% 0,1W
3553	4822 051 20223	22k 5% 0,1W	3633	4822 051 20105	1M 5% 0,1W
3554	4822 051 20223	22k 5% 0,1W	3634	4822 117 10833	10k 1% 0,1W
3555	4822 117 11149	82k 1% 0,1W	3635	4822 117 10833	10k 1% 0,1W
3556	4822 117 12955	2k7 1% 0,1W	3636	4822 117 11454	820R 1% 0,1W
3557	4822 117 12955	2k7 1% 0,1W	3637	4822 117 11454	820R 1% 0,1W
3558	4822 051 20105	1M 5% 0,1W	3638	4822 117 11449	2k2 1% 0,1W
3559	4822 051 20105	1M 5% 0,1W	3639	4822 117 11449	2k2 1% 0,1W
3560	4822 051 20471	470R 5% 0,1W	3640	4822 051 20273	27k 5% 0,1W
3561	4822 051 20471	470R 5% 0,1W	3641	4822 117 10833	10k 1% 0,1W
3562	4822 051 20822	8k2 5% 0,1W	3643	4822 051 20105	1M 5% 0,1W
3563	4822 051 20822	8k2 5% 0,1W	3644	4822 051 20471	470R 5% 0,1W
3564	4822 051 20391	390R 5% 0,1W	3645	4822 117 12955	2k7 1% 0,1W
3565	4822 051 20391	390R 5% 0,1W	3647	4822 101 21204	Potm Rotary 20KA
3566	4822 051 20153	15k 5% 0,1W	3648	4822 116 83883	470R 5% 0,5W
3567	4822 051 20153	15k 5% 0,1W	3650	4822 051 20104	100k 5% 0,1W
3568	4822 117 11383	12k 1% 0,1W	3651	4822 051 20104	100k 5% 0,1W
3569	4822 117 11383	12k 1% 0,1W	3652	4822 117 10833	10k 1% 0,1W
3570	4822 117 10833	10k 1% 0,1W	3653	4822 117 10833	10k 1% 0,1W
3571	4822 117 10833	10k 1% 0,1W	3655	4822 117 10833	10k 1% 0,1W
3574	4822 051 20223	22k 5% 0,1W	3656	4822 051 20478	4R7 5% 0,1W
3575	4822 051 20223	22k 5% 0,1W	3657	4822 051 20478	4R7 5% 0,1W
3576	4822 117 11507	6k8 1% 0,1W	4214	4822 051 20008	0R Jumper 0805
3577	4822 117 11507	6k8 1% 0,1W	4218	4822 051 20008	0R Jumper 0805
3580	4822 051 20223	22k 5% 0,1W	4222	4822 051 20008	0R Jumper 0805
3581	4822 051 20223	22k 5% 0,1W	4224	4822 051 20008	0R Jumper 0805
3582	4822 117 12955	2k7 1% 0,1W	4226	4822 051 20008	0R Jumper 0805
3583	4822 117 12955	2k7 1% 0,1W	4229	4822 051 20008	0R Jumper 0805
3584	4822 051 10102	1k 2% 0,25W	4244	4822 051 20008	0R Jumper 0805
3585	4822 051 20479	47R 5% 0,1W	4268	4822 051 20008	0R Jumper 0805
3586	4822 117 11449	2k2 1% 0,1W	4501	4822 051 20008	0R Jumper 0805
3587	4822 117 11507	6k8 1% 0,1W	4502	4822 051 20008	0R Jumper 0805
3588	4822 051 20471	470R 5% 0,1W	4505	4822 051 20008	0R Jumper 0805
3592	4822 051 20153	15k 5% 0,1W	4506	4822 051 20008	0R Jumper 0805
3593	4822 051 10102	1k 2% 0,25W	4508	4822 051 20008	0R Jumper 0805
3594	4822 051 10102	1k 2% 0,25W	4509	4822 051 20008	0R Jumper 0805
3596	4822 051 20683	68k 5% 0,1W	4510	4822 051 20008	0R Jumper 0805
3597	4822 051 20683	68k 5% 0,1W	4511	4822 051 20008	0R Jumper 0805
3601	4822 116 83884	47k 5% 0,5W	4512	4822 051 20008	0R Jumper 0805

## RESISTORS

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4513	4822 051 20008	0R Jumper 0805
4514	4822 051 20008	0R Jumper 0805
4515	4822 051 20008	0R Jumper 0805
4516	4822 051 20008	0R Jumper 0805
4517	4822 051 20008	0R Jumper 0805
4518	4822 051 20008	0R Jumper 0805
4519	4822 051 20008	0R Jumper 0805
4520	4822 051 20008	0R Jumper 0805
4521	4822 051 20008	0R Jumper 0805
4522	4822 051 20008	0R Jumper 0805
4523	4822 051 20008	0R Jumper 0805
4524	4822 051 20008	0R Jumper 0805
4525	4822 051 20008	0R Jumper 0805
4526	4822 051 20008	0R Jumper 0805
4530	4822 051 20008	0R Jumper 0805
4531	4822 051 20008	0R Jumper 0805
4532	4822 051 20008	0R Jumper 0805
4533	4822 051 20008	0R Jumper 0805
4534	4822 051 20008	0R Jumper 0805
4535	4822 051 20008	0R Jumper 0805
4536	4822 051 20008	0R Jumper 0805
4537	4822 051 20008	0R Jumper 0805
4538	4822 051 20008	0R Jumper 0805
4539	4822 051 20008	0R Jumper 0805
4540	4822 051 20008	0R Jumper 0805
4541	4822 051 20008	0R Jumper 0805
4542	4822 051 20008	0R Jumper 0805
4543	4822 051 20008	0R Jumper 0805
4544	4822 051 20008	0R Jumper 0805
4545	4822 051 20008	0R Jumper 0805
4546	4822 051 20008	0R Jumper 0805
4547	4822 051 20008	0R Jumper 0805
4549	4822 051 20008	0R Jumper 0805
4550	4822 051 20008	0R Jumper 0805
4551	4822 051 20008	0R Jumper 0805
4552	4822 051 20008	0R Jumper 0805
4553	4822 051 20008	0R Jumper 0805
4554	4822 051 20008	0R Jumper 0805
4555	4822 051 20008	0R Jumper 0805
4556	4822 051 20008	0R Jumper 0805
4557	4822 051 20008	0R Jumper 0805
4558	4822 051 20008	0R Jumper 0805
4559	4822 051 20008	0R Jumper 0805
4560	4822 051 20008	0R Jumper 0805
4561	4822 051 20008	0R Jumper 0805
4563	4822 051 20008	0R Jumper 0805
4564	4822 051 20008	0R Jumper 0805
4565	4822 051 20008	0R Jumper 0805
4566	4822 051 20008	0R Jumper 0805
4567	4822 051 20008	0R Jumper 0805
4568	4822 051 20008	0R Jumper 0805
4569	4822 051 20008	0R Jumper 0805

4570	4822 051 20008	0R Jumper 0805
4571	4822 051 20008	0R Jumper 0805
4572	4822 051 20008	0R Jumper 0805
4573	4822 051 20008	0R Jumper 0805
4574	4822 051 20008	0R Jumper 0805
4575	4822 051 20008	0R Jumper 0805
4579	4822 051 20008	0R Jumper 0805
4580	4822 051 20008	0R Jumper 0805
4601	4822 051 20008	0R Jumper 0805
4602	4822 051 20008	0R Jumper 0805
4603	4822 051 20008	0R Jumper 0805
4605	4822 051 20008	0R Jumper 0805
4606	4822 051 20008	0R Jumper 0805
4607	4822 051 20008	0R Jumper 0805
4608	4822 051 20008	0R Jumper 0805
4609	4822 051 20008	0R Jumper 0805
4610	4822 051 20008	0R Jumper 0805
4611	4822 051 20008	0R Jumper 0805
4612	4822 051 20008	0R Jumper 0805
4613	4822 051 20008	0R Jumper 0805
4677	4822 051 20008	0R Jumper 0805

## COILS &amp; FILTERS

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5202	4822 157 71285	Coil 400μH 30%
5321	4822 157 62552	Coil 2,2μH 5%
5322	4822 157 62552	Coil 2,2μH 5%
5324	4822 157 62552	Coil 2,2μH 5%
5501	4822 157 62552	Coil 2,2μH 5%
5502	4822 157 62552	Coil 2,2μH 5%
5503	4822 157 62255	Coil 18,5 turns
5504	4822 157 62255	Coil 18,5 turns
5505	4822 157 62255	Coil 18,5 turns
5506	4822 157 62255	Coil 18,5 turns
5507	4822 157 62552	Coil 2,2μH 5%
5508	4822 526 10704	Fe Bead 100MHz
5640	4822 157 11526	Coil 22μH 5%

## DIODES

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6220	4822 130 31878	1N4003G
6221	4822 130 31878	1N4003G
6222	4822 130 31878	1N4003G
6223	4822 130 31878	1N4003G
6224	4822 130 31878	1N4003G
6225	4822 130 31878	1N4003G
6226	4822 130 31878	1N4003G
6227	4822 130 31878	1N4003G
6228	4822 130 34173	BZX79-B5V6
6229	4822 130 34379	BZX79-B27
6230	4822 130 31878	1N4003G
6231	4822 130 34174	BZX79-B4V7
6232	4822 130 30621	1N4148
6233	4822 130 30621	1N4148

6236	4822 130 34233	BZX79-B5V1
6240	4822 130 31878	1N4003G
6241	4822 130 31878	1N4003G
6242	4822 130 31878	1N4003G
6243	4822 130 31878	1N4003G
6244	4822 130 31878	1N4003G
6245	4822 130 31878	1N4003G
6248	4822 130 31878	1N4003G
6249	4822 130 31878	1N4003G
6250	4822 130 31878	1N4003G
6251	4822 130 31878	1N4003G
6321	4822 130 31878	1N4003G
6322	4822 130 31878	1N4003G
6323	4822 130 31878	1N4003G
6324	4822 130 31878	1N4003G
6325	4822 130 34281	BZX79-B15
6326	4822 130 31024	BZX79-B18
6327	5322 130 31504	BZX79-B3V3
6328	4822 130 31878	1N4003G
6329	4822 130 30621	1N4148
6330	4822 130 30621	1N4148
6442	4822 130 10792	LTL-1CHPE
6443	4822 130 10792	LTL-1CHPE
6444	4822 130 10792	LTL-1CHPE
6502	4822 130 34173	BZX79-B5V6
6549	4822 130 30621	1N4148
6550	4822 130 30621	1N4148
6551	4822 130 30862	BZX79-B9V1
6552	4822 130 30621	1N4148
6553	4822 130 31878	1N4003G

7503	4822 130 41096	BC550C
7504	4822 130 41096	BC550C
7505	4822 130 44568	ON4986
7506	4822 130 44568	ON4986
7507	4822 130 44568	ON4986
7508	4822 130 44568	ON4986
7530	5322 209 14482	HEF4069UBT
7537	4822 130 60511	BC847B
7538	4822 130 60511	BC847B
7539	4822 130 60511	BC847B
7540	4822 130 60511	BC847B
7543	4822 130 60511	BC847B
7544	4822 130 60511	BC847B
7545	4822 130 60511	BC847B
7546	4822 130 60511	BC847B
7547	4822 130 60511	BC847B
7548	4822 130 60511	BC847B
7549	4822 130 60511	BC847B
7550	4822 130 60511	BC847B
7554	4822 209 31378	NJM4556MB
7556	5322 130 60508	BC857B
7641	4822 130 41096	BC550C /21/21M
7642	4822 130 41096	BC550C /21/21M
7643	4822 130 41096	BC550C /21/21M

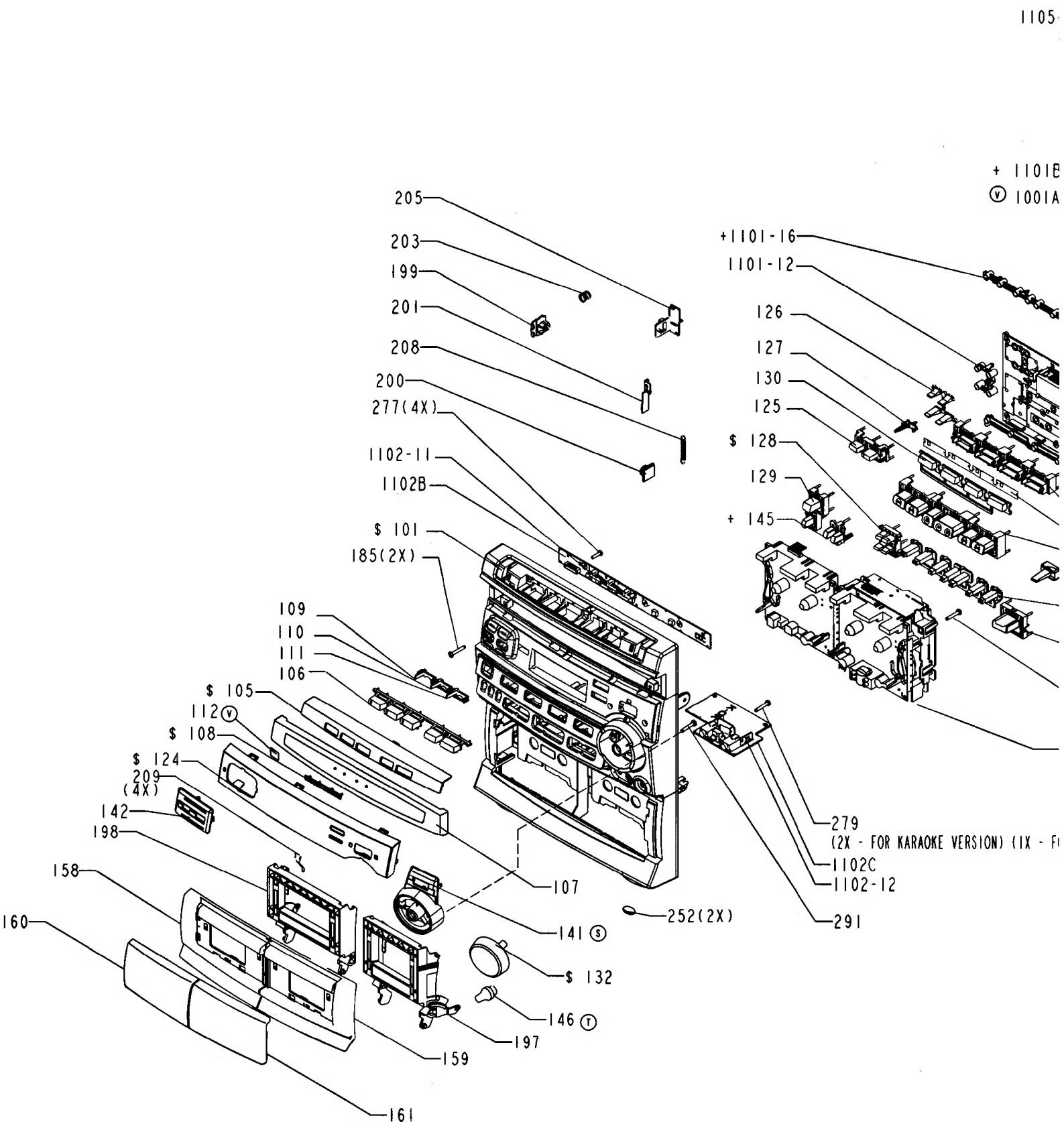
Note: Only the parts mentioned in this list are normal service spare parts.

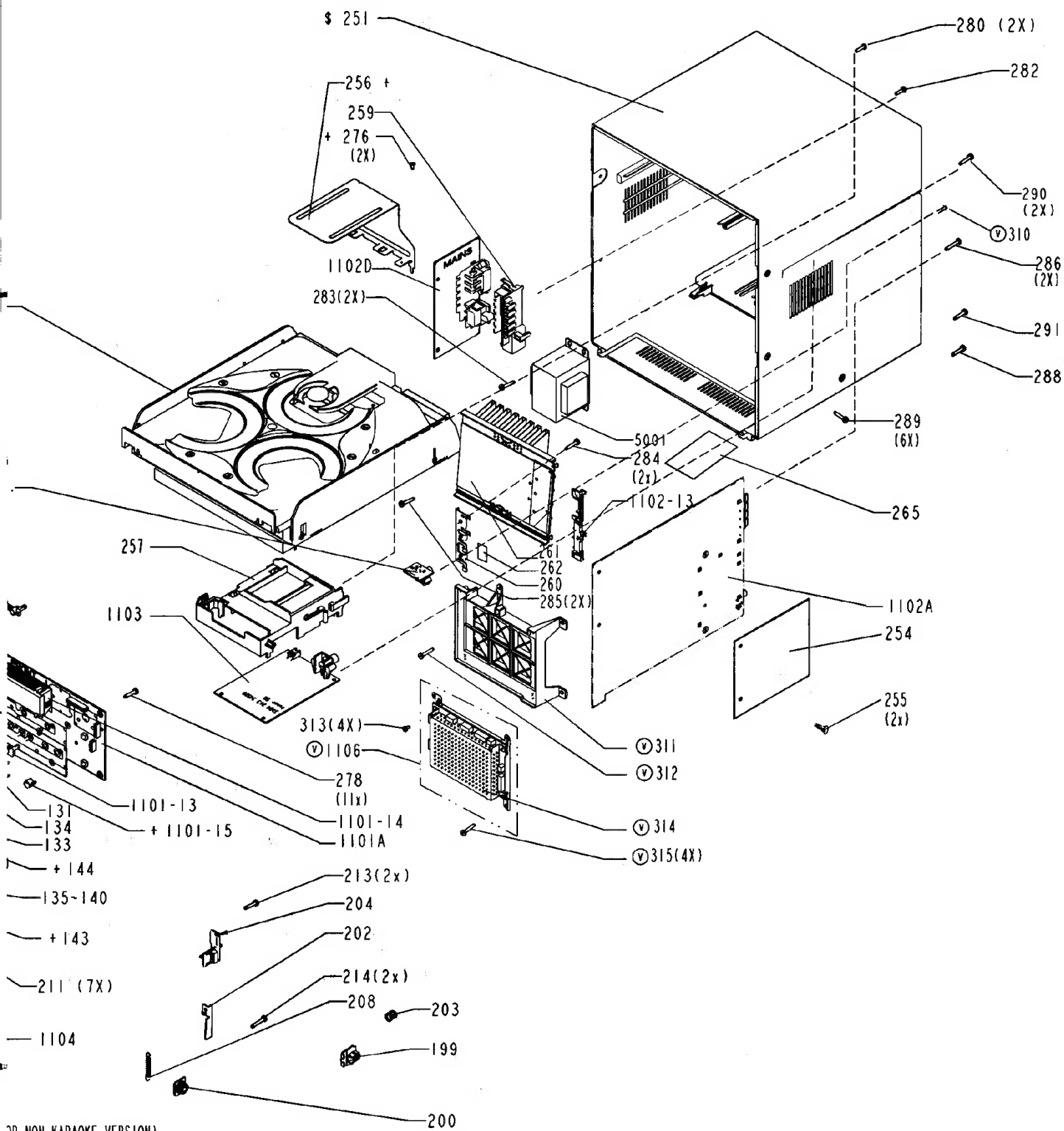
#### TRANSISTORS & INTEGRATED CIRCUITS

7240	4822 130 40959	BC547B
7241	4822 130 40959	BC547B
7247	4822 130 40981	BC337-25
7248	4822 130 40981	BC337-25
7249	4822 130 41246	BC327-25
7250	4822 209 33575	L7812CP
7320	4822 130 42804	BC817-25
7321	4822 130 42804	BC817-25
7322	4822 130 42804	BC817-25
7323	4822 130 42804	BC817-25
7329	4822 130 10847	BDW94C
7330	4822 130 40959	BC547B
7331	5322 130 60508	BC857B
7332	5322 130 60508	BC857B
7333	4822 130 42804	BC817-25
7391	4822 209 16224	AN7125
7400	5322 130 60508	BC857B
7401	4822 130 40981	BC337-25
7402	5322 209 11306	HEF4094BT
7501	5322 209 11102	HEF4052BT



## EXPLODED VIEW - MAIN UNIT





## LEGEND:

\$	DETAIL VARY DEPENDING ON VERSIONS/MODELS
+	NOT INCLUDED FOR ALL VERSIONS/MODELS
Ⓥ	KARAOKE VERSIONS ONLY
Ⓢ	INCREDIBLE SURROUND VERSIONS ONLY
Ⓥ	VCD VERSION ONLY
*	BREAKAWAY FROM SERVO PCB

**MECHANICAL & ACCESSORIES PARTS LIST - MAIN UNIT**

101	4822 459 05265	Cabinet Front	255	4822 466 93148	Spacer 5mm
101	4822 459 05272	Cabinet Front /21/21M	260	4822 492 11734	Spring, IC
105	4822 450 10608	Window CDC Control	349	4822 445 10832	Surround Box FW398C
106	4822 410 12232	Button CDC Select	350	4822 445 10837	Loudspeaker FW390C/22/34
107	4822 442 01746	Cover Tray CDC	350	4822 445 10826	Loudspeaker FW390C/37
107	4822 442 01699	Cover Tray CDC /37	350	4822 445 10813	Loudspeaker FW398C/34
108	4822 454 13035	Badge Philips	350	4822 445 10831	Loudspeaker - other versions
108	4822 454 13265	Badge Ph-Mag /37	351	4822 303 50063	FM Aerial 75R
124	4822 450 10626	Wind. Disp. FW390C	351	4822 320 11094	FM Aerial 300R /37
124	4822 450 10646	Wind. Disp. FW390C/22/34	356	4822 219 10694	Remote Control
124	4822 450 10629	Window Display FW398C	356	4822 219 10687	Remote Control /37
124	4822 450 10673	Window Display FW398C/34	384	4822 303 50082	AM Frame Aerial
125	4822 410 12233	Button DSC/DBB	385	4822 321 10249 Δ	Mains Cord /21/21M/22/34
128	4822 410 12234	Button Set Clock	385	4822 321 10954 Δ	Mains Cord /30
128	4822 410 12407	Button Set Clk-RDS /22/34	385	4822 321 11466 Δ	Mains Cord /37
129	4822 410 12235	Button Power/Rec.	387	4822 736 16757	Instruct. for use /21/21M/30
130	4822 380 10262	Lightguide Source Sel.	387	4822 736 16849	Instruct. for use /22
131	4822 410 12236	Button Set Source Select	387	4822 736 16848	Instruct. for use /34
132	4822 410 12237	Knob Volume Rotary	387	4822 736 16749	Instruct. for use /37
133	4822 410 11729	Button Set Controls	1451	4822 320 12604	Flex Cable 9pin 22cm
141	4822 442 01779	Cover IS	1455	4822 320 12654	Flex Cable 7pin 22cm
142	4822 442 01702	Cover DSC/DBB	1456	4822 320 11974	Flex Cable 15pin 19cm
143	4822 410 12325	Button IS	1557	4822 320 12663	Flex Cable 7pin 34cm
145	4822 410 12326	Button Replay/Rec	5001	4822 146 10951 Δ	Mains Transformer /21/21M
146	4822 410 12277	Knob Karaoke /21/21M	5001	4822 146 10949 Δ	Mains Transformer/22/30/34
158	4822 443 11179	Cover Cassette Door Left	5001	4822 146 10957 Δ	Mains Transformer /37
159	4822 443 11181	Cover Cassette Door Right			
160	4822 381 12054	Lens Cassette Left			
161	4822 381 12055	Lens Cassette Right	<b>LEFT/RIGHT LOUDSPEAKER BOX BREAKDOWN</b>		
197	4822 443 10488	Door Cassette Right	4822 240 10369	Woofer 5,25" 6R 20-40W	
198	4822 443 10487	Door Cassette Left	4822 240 10307	Woofer 5,25" 6R 20-40W FW398C/34	
199	4822 402 10621	Push-catch	4822 240 10371	Tweeter 2,5" 6R 100-140W	
200	4822 529 10322	Damper Assembly	4822 240 10306	Tweeter 2,5" 6R 100-140W FW398C/34	
203	4822 492 11344	Spring Compression	4822 464 10523	Neutral Cloth Frame Assy	
204	4822 402 11246	Bracket Right	4822 458 10668	Neutral Cloth Frame Assy FW398C/34	
205	4822 402 11245	Bracket Left	<b>SURROUND BOX BREAKDOWN</b>		
208	4822 492 11345	Spring Tension	4822 240 10353	Speaker 3" 6R 3W	
209	4822 492 42787	Spring Cassette			
251	4822 426 10803	Cabinet Rear L/R /21	Note: Only the parts mentioned in this list are normal service spare parts.		
251	4822 426 10798	Cabinet Rear L/R /21M/34			
251	4822 426 10828	Cabinet Rear L/R /22			
251	4822 426 10799	Cabinet Rear L/R /37			
251	4822 426 10815	Cabinet Rear Matrix /21/30			
251	4822 426 10814	Cabinet Rear Matrix /21M/34			
252	4822 462 40683	Plate (Foot)			

**SCREW LISTS - MAIN UNIT**

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185 D3 x 12

211 D3 x 12

213 D3 x 12

214 D3 x 12

277 D3 x 12

278 D3 x 12

279 D3 x 12

280 D3 x 12

282 D3 x 12

283 D3 x 16

284 M3 x 15

285 D3 x 16

286 D3 x 12

288 D3 x 12

289 D3 x 12

290 D3 x 12

291 D3 x 12

292 D3 x 12